IMPERIAL ... INSTITUTE
5 APR 1945

TROPICAL DISEASES BULLETIN

VOL. 42.] 1945. [No. 2.

MAIN CONTENTS:

	PAGES
Summary of Recent Abstracts II. Yellow Fever	81–84
Malaria	85–95
Blackwater Fever	95
Trypanosomiasis	96–100
Leishmaniasis...	100–102
Fevers of the Typhus Group...	102–114
Yellow Fever	114–117
Dengue and Sandfly Fever ...	117–119
Cholera	119–121
Bacillary Dysentery	121–124
Amoebiasis and Intestinal Protozoal Infections	124–130
Relapsing Fever and other Spirochaetoses	130–131
Yaws	131–132
Leprosy	132–133
Helminthiasis	133–137
Deficiency Diseases	137–141
Haematology	141
Venoms and Antivenenes ...	141–142
Dermatology and Fungous Diseases	142–143
Heat Stroke and Allied Conditions	143–146
Miscellaneous Diseases ...	146–150
General Entomology	150–153
Reports, Surveys and Miscellaneous Papers	153–154
Book Reviews	154

For detailed Contents see pp. ii, iv, vi and vii.

Issued under
the Direction of the
Honorary Managing Committee of the
BUREAU OF HYGIENE AND TROPICAL DISEASES,
Keppel Street, London, W.C.1.
(Telephone: MUSEUM 3041)

Price 2/6 Net.] *Entered as Second Class Matter in the U.S.A. Post.* [Annual Subscription 21/-

HONORARY MANAGING COMMITTEE

APPOINTED BY THE SECRETARY OF STATE FOR THE COLONIES.

Chairman: W. H. Kauntze, *C.M.G.*, *M.B.E.*, M.D., D.P.H., M.R.C.P.
(*Chief Medical Adviser to the Secretary of State for the Colonies*).

Wm. Horner Andrews, D.Sc., M.R.C.V.S.

Lieut.-General Sir Ernest W. C. Bradfield, *K.C.I.E.*, I.M.S. (retd.).

Sir Wilson Jameson, *K.C.B.*, LL.D., M.D., F.R.C.P. (*representing the Ministry of Health*).

Professor Patrick A. Buxton, M.A., M.R.C.S., L.R.C.P., D.T.M. & H., F.R.S.
(*representing the Royal Society*).

Sir Philip Manson-Bahr, *C.M.G.*, *D.S.O.*, M.D., F.R.C.P., D.T.M. & H.

Sir Edward Mellanby, *K.C.B.*, M.D., F.R.C.P., F.R.S., K.H.P.
(*representing the Medical Research Council*).

E. R. A. Merewether, M.D., M.R.C.P., F.R.S.E., K.H.P.

Brigadier G. S. Parkinson, *D.S.O.*, M.R.C.S., L.R.C.P., D.P.H., R.A.M.C.

J. B. Sidebotham, M.A. (*of the Colonial Office*).

Secretary: C. A. Grossmith, *of the Colonial Office*.

STAFF OF THE BUREAU:

Acting Director: Charles Wilcocks, M.D., M.R.C.P., D.T.M. & H.

Acting Assistant Director: J. F. Corson, *O.B.E.*, M.D., D.P.H., D.T.M. & H.

Secretary: R. L. Sheppard.

LIST OF ABSTRACTERS IN THIS ISSUE.

Harold Burrows, *C.B.E.*, F.R.C.S.

Professor P. A. Buxton, M.A., M.R.C.S., L.R.C.P., D.T.M. & H., F.R.S. (*Sectional Editor*).

E. G. L. Bywaters, M.B., B.S., M.R.C.P.

J. F. Corson, *O.B.E.*, M.D., D.P.H., D.T.M. & H.

Professor L. P. Garrod, M.D., F.R.C.P.

Lt.-Col. W. F. Harvey, *C.I.E.*, M.B., F.R.C.P.E., D.P.H., I.M.S. (retd.) (*Sectional Editor*).

F. Hawking, D.M., D.T.M.

Professor Edward Hindle, M.A., Sc.D., Ph.D., F.R.S. (*Sectional Editor*).

C. A. Hoare, D.Sc.

G. Lapage, M.D., M.Sc.

Sir Phillip Manson-Bahr, *C.M.G.*, *D.S.O.*, M.D., F.R.C.P., D.T.M. & H.

Maj.-Gen. Sir John W. D. Megaw, *K.C.I.E.*, D.Sc., M.B., B.Ch., I.M.S. (retd.) (*Sectional Editor*).

Professor W. J. B. Riddell, M.D., F.R.F.P.S., D.O.M.S., F.R.S.E.,

Sir H. Harold Scott, *K.C.M.G.*, M.D., F.R.C.P., D.P.H., D.T.M. & H.

H. S. Stannus, Ph.D., M.D., F.R.C.P., D.T.M. & H. (*Sectional Editor*).

Sydney Thomson, M.D., F.R.C.P., F.R.S.E. (*Sectional Editor*).

J. Waterlow, M.B., B.Ch.

C. M. Wenyon, *C.M.G*, *C.B.E.*, M.B., B.S., B.Sc., F.R.S. (*Sectional Editor*).

F. Norman White, *C.I.E.*, M.D., D.P.H., I.M.S. (retd.) (*Sectional Editor*).

V. B. Wigglesworth, M.D., B.Ch., F.R.S.

Charles Wilcocks, M.D., M.R.C.P., D.T.M. & H.

BUREAU OF HYGIENE AND TROPICAL DISEASES.

TROPICAL DISEASES BULLETIN.

Vol. 42.] 1945. [No. 2.

SUMMARY OF RECENT ABSTRACTS.*

II. YELLOW FEVER.

Epidemiology.

KIRK (p. 121) has contributed an account of the outbreak of yellow fever which occurred in the Sudan in 1940, in relation to the epidemiology of the disease in Africa as a whole, and to its spread and control. The virus may be present in places where there is no evidence of active disease, and yet where practically the whole population is immune ; within the endemic area, however, rural outbreaks may occur (as in the Sudan), but spread may also take place by gradual extension of the present endemic area in the absence, at first, of any noticeable epidemic of recognized cases. [This paper should be read in original by those interested in yellow fever in Africa.]

A viscerotomy service has been in operation in the Belgian Congo since 1938, and has disclosed six cases of yellow fever, from widely separated areas, in a total of 4,340 examinations. LIEGEOIS (p. 1025) considers that these were probably cases of jungle yellow fever, because, in spite of search and protection tests, it was impossible to find other cases in their vicinity, and it is therefore difficult to explain their occurrence except by the assumption that there was some reservoir of infection other than man. Protection tests have been carried out with sera from all parts, and in certain areas (which are named) there is evidence of recent disease in that the sera of children are not uncommonly positive. In other parts of the country no evidence of immunity was found.

CECCALDI (p. 846) reports on the yellow fever activities of the Pasteur Institute of Brazzaville during 1942. Vaccinations were carried out and tests of sera made ; the account is of more local than general interest.

Immune bodies to the yellow fever virus have been found in monkeys and other animals from Africa. The evidence suggests that monkeys may be reservoirs of infection, but monkeys are not known to travel far, and it occurred to FINDLAY and COCKBURN (p. 122) that birds might act in this capacity. They therefore searched for, and found, yellow fever virucidal bodies in birds, and if it can be established that these bodies are the result of infection with the virus, the findings may throw light on the maintenance of the disease. The authors note, however, that protective bodies have been found in domestic animals from areas in which yellow fever is not known to exist,

*The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1944, v. 41. References to the abstracts are given under the names of the authors quoted and the pages on which the abstracts are printed.

SMITH *et al.* (p. 210), reviewing the results of histological liver examination, and of protection tests, carried out in Colombia in recent years, conclude that the jungle type of yellow fever is probably continuously present in certain areas of the country. On the other hand, with the exception of one very small epidemic in Buenavista, Caldas, in 1937, no instance of yellow fever transmitted by *Aëdes aegypti* has been observed in Colombia since 1929.

As a result of careful investigation of jungle yellow fever in Colombia, BUGHER *et al.* (p. 475) have been able to present a very full account of the epizoology and epidemiology of the disease. The disease is transmitted among forest animals by *Haemagogus capricorni*, an arboreal mosquito which has been proved a vector by bite and which has been found infected in nature. *Haemagogus capricorni* may survive the dry season in the tree tops, and infected mosquitoes may carry the virus into the next breeding season at the beginning of the rains; no virus has been found in larvae collected in this study. *Aëdes leucocelaenus* has also been found infected in nature, and it is possible that *Aëdes fluviatilis* and *Aëdes scapularis* may also play a part. Of the forest animals in which the disease is maintained, only primates and marsupials are important, though other animals have been found to be immune. The primates and marsupials are arboreal in habit. In them virus is present in the blood for a few days only, the animals do not suffer any important illness, but develop antibodies within a short time and then become permanently immune. In an immune community, explosive outbreaks, such as occur in non-immune communities, do not take place. The movements of infected animals are not seriously impeded, and their migration can play an important part in spreading the disease. Man becomes infected when in contact with the forest, *Haemagogus* acting as vector from animal to man, but if the human population is dense *Haemagogus* may act as vector from man to man.

BATES (p. 749) has extended the earlier work of BUGHER *et al.* on the susceptibility of marsupials to yellow fever virus. Details of the experiments should be sought in the original, but the author admits that it is difficult to form an opinion of the importance of these animals in the epidemiology and epizoology of jungle yellow fever.

The results of a large survey of human blood samples, by the intraperitoneal mouse protection test, in areas extending from Mexico to Colombia, lead to the conclusion that, in recent years, endemic yellow fever has been restricted to Eastern Panama (KUMM and CRAWFORD, p. 123).

POTENZA (p. 479) reports that no evidence of yellow fever was found in the viscerotomy service of Venezuela between 1937 and 1940.

Aetiology: Transmission.

The ordinary Asibi strain of yellow fever virus could not be established in young chicks by intracerebral inoculation, but LAEMMERT and MOUSSATCHÉ (p. 123) have succeeded in establishing in this fashion a strain which had grown in tissue culture and subsequently been passaged in developing fowl embryos. The strain lost its viscerotropism for *rhesus* monkeys, but not its neurotropism on intracerebral injection into these animals.

BATES and WEIR (p. 747), LAEMMERT (p. 747) and BATES (p. 749) report on experiments in which tests of susceptibility to yellow fever virus were made in cane rats, marmosets and *Saimiri* monkeys respectively. This work is interesting from the point of view of laboratory animals, but the details of the results should be sought in the original papers.

DE ASSUMPÇÃO (p. 936) has demonstrated cross protection between a strain of classical neurotropic yellow fever virus and two strains of jungle yellow fever virus.

Koprowski and Lennette (p. 1030) have shown that addition of sulphapyridine or sulphathiazole to tissue cultures does not interfere with the propagation of yellow fever virus; suitable concentrations of the drugs could aid direct isolation of the virus by their action against bacterial contaminants. The same authors (p. 1030) have shown that these drugs have no therapeutic value in infected mice, and that they do not prevent propagation of the virus in developing fowl embryos.

Lewis (p. 278) has found *Aëdes aegypti* widely distributed in Eritrea up to a height of about 1,650 metres. Several other potential vectors of yellow fever were also found.

Lewis (p. 213) has noticed that small water-tortoises, found in some water jars in the Sudan, feed voraciously on mosquito larvae, and that the larvae of *Aëdes aegypti* were not found in such jars, though present in others in which there were no tortoises.

Bates (p. 936) considers that *Haemagogus capricorni*, which is found in the forest canopy of Colombia, is kept in the tree tops by a response to the humidity gradient: an avoidance of the zones with a relative humidity of 85 per cent. It becomes more abundant at ground level in open, dry localities, or after a succession of clear days. This mosquito has a single diurnal peak of activity around midday.

Control: Vaccination.

Investigation the complement fixation test in yellow fever, Lennette and Perlowagora (p. 211) have overcome the difficulty of procuring a suitable antigen by making use of techniques found satisfactory in similar work with other viruses, which are described in detail. They find that the test, in which the antigen is derived from infected mouse brain, is specific. In monkeys, complement-fixing antibodies are found in the blood at the end of the second week after infection, reaching a maximum about the third week, and thereafter gradually disappearing. In persons vaccinated with 17 D, if there was no post-vaccination reaction, the antibodies occurred in only about 20 per cent.; if there was a severe reaction, the antibodies were present in up to 80 per cent. of subjects. Natural yellow fever was followed by a high antibody rate. This test is of no value for the routine checking of post-vaccination results, but may be very useful in field immunity surveys, since the relatively rapid disappearance of complement-fixing antibodies from the blood after infection indicates that, if these bodies are present, the infection must have been fairly recent. Wassermann-positive sera tend to give non-specific reactions, which can usually be avoided by inactivation of the sera at 65°C.

In the *Bol. Oficina Sanitaria Panamericana* (p. 212) is a brief statement of the record of the Brazilian Government and the Rockefeller Foundation in eliminating *Aëdes aegypti* from several of the States of Brazil. Reference is also made to the extensive viscerotomy service which has been established, and to the large vaccination campaign undertaken.

Bugher and Gast-Galvis (p. 478) review the evidence of the protective action of yellow fever vaccine in Colombia by quoting figures which show that in exposed populations the disease practically never occurred in persons who had been vaccinated, though a considerable number of cases were found in those who had not. Even in vaccinated persons whose sera no longer showed protective substances by the mouse protection test, no cases were found, but although this probably indicates some residual immunity, it is probably wise to re-vaccinate such persons. The evidence of protection conferred by the vaccine is very convincing.

Fox *et al.* (p. 123) have studied the immunity responses to vaccine virus 17D in the field. Certain substrains showed minor differences in antigenic power, but

on the whole were very similar. There was evidence that small doses might give better immune responses than large doses, but the authors conclude that the dose for routine vaccination should consist of not less than 500 minimum infective doses for mice, in order to immunize a satisfactory proportion of persons vaccinated. Serum-free vaccine can safely be given in saline dilutions as high as 1 in 100, when the virus content permits. The authors confirm the value of virus 17D as a protective agent.

Fox and Penna (p. 125) have studied the behaviour of vaccine virus 17D in *rhesus* monkeys, as observed during the routine control of individual batches of the vaccine. The quantity of virus in the intracerebral inoculum is related to occurrence of circulating virus, and of serum antibodies, and to the onset and duration of the febrile reaction : the larger the dose, the earlier the appearance of virus, antibodies and fever.

Experience in Brazil had shown that certain batches of vaccine virus 17D had failed to give adequate protection, whereas with other batches the result was satisfactory. The batches which failed had been prepared from virus at the 305th to 391st subculture ; the satisfactory batches from virus at the 229th to 255th subcultures. Bugher and Smith (p. 477) investigated the matter, and found that high subcultures did not in themselves necessarily produce loss of immunizing power. It was then thought that the pools of human serum used in culture, which had been taken from persons in Brazil, may have contained specific antibodies too weak to have been detected by the protection test then in use, and that the virus, growing in contact with these antibodies, might on this account have suffered a reduction in antigenic power. Tests were therefore made, with parallel controls, by cultivating 17D through 57 passages, in contact with specific antibodies barely insufficient to prevent multiplication, and by titration of the protective bodies produced by inoculation of various doses of these strains in human volunteers. No significant differences could be found, and it is therefore concluded that growth of the virus in the presence of such amounts of antibody does not affect antigenic power as measured by the mouse protection test.

Swartz (p. 278) reports a severe constitutional allergic reaction in a man who had received an injection of yellow fever vaccine. He was found to be sensitive to egg and fowl tissues, and it is thought that as the vaccine had been prepared from inoculated eggs, this fact explained the reaction.

Sawyer *et al.* (p. 1026) have contributed a lengthy and comprehensive study of jaundice in men of the United States forces vaccinated against yellow fever. The interest lies, of course, in the hepatitis, since it has conclusively been shown that the yellow fever virus itself was not the cause of the condition. The vaccine is no longer prepared in a medium containing human serum, and hepatitis should not occur. These papers contain very full discussions of the relevant problems. Turner *et al.* (p. 750) report on a considerable outbreak of hepatitis in United States troops who had been inoculated with icterogenic yellow fever vaccine. There is, of course, no suggestion that the disease was in any way related to yellow fever. Findlay *et al.* (p. 1028) give a description of 670 cases of hepatitis after yellow fever vaccination, in West Africa, and consider in detail the clinical, epidemiological and immunological data. Here again the yellow fever interest is incidental. Jones and Maurer (p. 939) have failed to produce jaundice in horses by injection of icterogenic yellow fever vaccine. The virus of yellow fever could not be detected in the serum of the horses after the inoculations. *Charles Wilcocks.*

MALARIA.

COLLIER, Jean M. **A Case of Malaria acquired near Sydney, New South Wales.** *Med. J. Australia.* 1944, Aug. 26, v. 2, No. 9, 213–14.

WOLPERS, C. Zur elektronenoptischen Darstellung der Malaria tertiana. [**The Parasite of Tertian Malaria under the Electron Microscope.**] *Klin. Woch.* 1942, Nov. 28, v. 21, No. 48, 1049–54, 12 figs. [18 refs.]

The author, who has been studying the benign tertian malarial parasite —*P. vivax*—by means of the electron-microscope, gives in this paper an account of his observations and the methods he has employed in making them. The work is highly technical and has involved a preliminary study of normal erythrocytes by special methods. It is admitted that the interpretation of the appearance of the malarial parasites is very difficult, nevertheless the following conclusions have been drawn. At a very early stage in the invasion of an erythrocyte by a malarial parasite diffuse changes occur in the membrane of the cell, while the haemoglobin, altered in some way, is deposited on the membrane in discrete masses representing Schüffner's dots. Later stages of the parasite can be seen to be anchored to the cell membrane by claw-like processes. When schizogony commences the lipoids of the cell membrane are absorbed by the parasite and deposited on the surface of the merozoites as a protective covering. When the merozoite penetrates an erythrocyte the lipoidal covering is discarded, the parasite continuing its growth within the erythrocyte without any protective sheath. The various appearances described in the paper are illustrated by a dozen micro-photographs. *C. M. Wenyon.*

RUGE, H. & KREMER, H. Morphologische Änderung der Malariaparasiten bei Atebrinprophylaxe. [**Morphological Changes in the Malarial Parasite under Atebrin Prophylaxis.**] *Ztschr. f. Hyg. u. Infektionskr.* 1942, Dec. 31, v. 124, No. 5, 441–51, 20 coloured figs. on 1 folding pl. [20 refs.]

Various observers have studied the changes undergone by malarial parasites during atebrin treatment but no one has attempted hitherto to gauge the effect on the parasites of the drug when taken prophylactically in daily doses varying from 0·03 to 0·06 gm. With these daily doses the authors report that at a certain field station they were able to study the malarial parasites in 250 cases of malaria which had occurred in spite of the prophylactic atebrin. In these cases it was noted that many, but not all, of the parasites were abnormal in appearance, owing to changes which had occurred in the cytoplasm and chromatin. Unlike the effect of atebrin when administered in the larger therapeutic doses which bring about changes in the pigment, this material is little altered by the quantity given in prophylaxis. As regards the changes in the cytoplasm, there are formation of vacuoles, irregularities in staining, clumping, notching, formation of processes and assumption of a stellate form. The chromatin tends to break up into a varying number of fragments which are distributed throughout the cell and may become vacuolated. The various abnormalities described in the paper are illustrated in a coloured plate in which twenty infected red blood corpuscles are depicted. The changes produced render identification of the parasites, especially in thick films, a difficult matter.
C. M. Wenyon.

PURI, I. M. **Synoptic Tables for the Identification of the Full-Grown Larvae of the Indian Anopheline Mosquitoes.** 4th edition (revised). *Health Bull. No. 16* (*Malaria Bureau No. 7*). 109 pp., 83 figs. [Summary taken from *Rev. Applied Entom.* Ser. B. 1944, Oct., v. 32, Pt. 10, 182.]

In this revision of a bulletin already noticed, the advanced key that forms part of the early editions is omitted, and only one main key is given, including

all the species of *Anopheles* recorded from India, Burma and Baluchistan of which the larvae are known. In place of the advanced key, there are supplementary notes on the various species with keys to varieties. Some alterations have been made in the main key to simplify its use. As there are certain species that appear to be restricted to particular areas, five separate keys are given for Baluchistan, North-West Frontier Province and Sind ; Delhi Province and the Punjab ; Central India and Rajputana ; Peninsular India and the United Provinces ; and Eastern India and Burma. These geographical divisions are purely arbitrary. Characters found to differentiate a large majority of the larvae of *A. sundaicus*, Rdnw., and *A. subpictus*, Grassi, are incorporated for the first time.

i. Cochrane, E. **Is *A. argyritarsis* a Malarial Vector in Grenada ?** *Caribbean Med. J.* 1941, v. 3, No. 4, 193–5.

ii. ——. **Notes on *A. argyritarsis* and *A. pseudopunctipennis* in Grenada.** *Ibid.* 1942, v. 4, No. 3, 97–100.

Earle [this *Bulletin*, 1934, v. 31, 681] concluded that *Anopheles aquasalis* (*A. tarsimaculatus*) was the chief if not the only carrier of malaria in Grenada ; *A. argyritarsis* was easily infected in the laboratory but was not an important vector of malaria though it might be contributory along with *A. aquasalis*. The third species, *A. pseudopunctipennis*, present in Grenada, was probably not a carrier.

i. An outbreak of subtertian malaria in 1938, in a population of about 500 living along the bank of the St. John's river, led to a thorough search for larvae in the locality. No larvae of *A. aquasalis* were found within a radius of three miles from the river, but larvae of *A. argyritarsis* and *A. pseudopunctipennis* were numerous.

ii. A further study of *A. argyritarsis* and *A. pseudopunctipennis* was made ; 119 specimens of *A. argyritarsis*, out of 134 caught in three months, were dissected, none being found infected. Of 1,011 specimens of *A. pseudopunctipennis* caught in stables, 932 were dissected with negative results. A decline in the incidence of malaria in this locality coincided with a scarcity of *A. argyritarsis* ; *A. aquasalis* was found breeding there on one occasion only.

The author apparently considers that *A. argyritarsis* may be more important as a vector of malaria than it has been thought to be. *J. F. Corson.*

Unti, O. Resistência de ovos de algumas anofelinas de S. Paulo. [**Resistance of Eggs of Anophelines of São Paulo.**] *Arquivos de Hig. e Saúde Pública.* São Paulo. 1943, Sept., v. 8, No. 19, 65–72. English summary.

The observations recorded concern the eggs of *A. albitarsis*, *A. noroestensis* and *A. strodei*. Eggs kept in the laboratory on moist or dry filter paper remained viable from two to eight days ; in the winter this period was prolonged to 10, and exceptionally to 15 days. Eggs were also kept in more or less natural conditions, in receptacles containing moist earth from the natural breeding places ; the receptacles were kept in the open air. From the fourth day onwards rain water was added in quantity sufficient to keep the earth submerged. In these conditions the eggs remained viable from 4 to 15 days in both summer and winter. *Norman White.*

Unti, O. Oxigênio dos focos de anofeles de São Paulo. [**Dissolved Oxygen in Water of Anopheles Breeding Places in São Paulo.**] *Arquivos de Hig. e Saúde Pública.* São Paulo. 1943, Sept., v. 8, No. 19, 85–102, 4 figs. [10 refs.] English summary.

In his determination of the dissolved oxygen content of water in which *Anopheles* were breeding the author used Winkler's method, which he describes

at length. A table gives the results of the test in 22 natural breeding places. *A. albitarsis, A. pessôai, A. strodei* and *A. noroestensis* were found breeding in waters of varying degrees of organic pollution in which the dissolved oxygen content varied from 2·5 to 6 per million. *A. lanei, A. argyritarsis, A. darlingi A. parvus, A. lutzii* and *A. antunesi* showed a partiality for breeding in well oxygenated waters with much green vegetation ; the dissolved oxygen in their breeding places varied from 6·5 to 9·5 parts per million.

In the laboratory, water containing larvae of *A. albitarsis, A. argyritarsis, A. strodei* and *A. noroestensis* was slowly disoxygenated. The larvae remained active as long as the oxygen content was above 4 parts per million. When it was reduced to 1·5 parts per million the larvae died.

The author concludes that the pollution with organic matter of breeding places of *Anopheles* of the *Nyssorhynchus* group is an efficient and economical anti-larval measure. *Norman White.*

Unti, O. Ferro dos criadouros de anófeles e o "anofelismo" sem malária do vale do Paraíba. [**The Iron Content of Anopheline Breeding Waters in Malarial Regions and in the Malaria-free Paraiba Valley.**] *Arquivos de Hig. e Saúde Pública.* São Paulo. 1943, Sept., v. 8, No. 19, 105 –17. English summary.

There was a popular belief that the freedom from malaria that the valley of the Paraiba River enjoys, between Guararema and Queluz, in spite of the presence of anophelines, was due to the high iron content of the water of that river. To test the foundations for such a belief the author carried out a large number of observations. The iron content of waters in which *Anopheles* were breeding was determined in many places. There was no significant difference between the iron contents of waters in malarious and malaria-free areas. In the Northern Seaboard, where malaria is endemic, the waters are excessively ferruginous, much more so than the water of the Paraiba River.

Norman White.

Bol. Oficina Sanitaria Panamericana. 1944, June, v. 23, No. 6, 491–505. Segundo informe de la Comisión Panamericana de Malaria. [**Second Report of the Pan-American Malaria Commission.**]

This report contains a list of *Anopheles* known in North and South America, and lists are given of the anopheline fauna found in each of the countries. In addition there is a brief account of the amount of anti-malaria work completed in the years 1941–43. *Charles Wilcocks.*

Gupta, R. D. & Laha, P. N. **Hemiplegia in Chronic Malaria.** *J. Indian Med. Ass.* 1944, July, v. 13, No. 10, 296.

An Indian boy, aged six years, was admitted to hospital with a history of fever for two months and, on the previous day, a sudden onset of paralysis of the arm and leg on the right side. On admission his temperature, pulse rate and respiration rate were normal ; his face was pale and the spleen was enlarged to three inches below the ribs. Examination of the blood showed : erythrocytes 3,350,000 per cmm., haemoglobin 60 per cent., no malarial parasites, and negative W.R. The right arm and leg were completely paralysed and there was also slight facial paralysis on the right side ; the tendon jerks were increased slightly, the superficial abdominal reflexes on the right side were absent, the plantar reflex on the right side was extensor, there was apparently no loss of sensation.

He was given quinine sulphate, 3 grains thrice daily. The paralysis of the face and right arm disappeared by the third day and that of the leg by the fifth

day and he could then walk about freely. The reflexes had also become normal by then. His temperature had been afebrile throughout his stay in hospital. He was discharged cured.

The authors think that the symptoms were caused by embolism of malarial parasites in the left internal capsule. [ECKSTEIN, this *Bulletin*, 1943, v. 40, 517, mentions a somewhat similar case, but tertian fever was present.]

J. F. Corson.

LANCET. 1944, Nov. 18, 667–8; BRIT. MED. J. 1944, Nov. 18, 664.

Mepacrine for Malaria. Statement by MRC Committee on Malaria.

" In view of the great importance of malaria for warfare in the Far East and also in the Mediterranean region, a great deal of work has been carried out during recent years to evaluate the relative merits of the two chief antimalarial drugs available at the present time—viz., mepacrine (' Atebrin,' ' Quinacrine ') and quinine. The conclusions reached are shown by the resolutions (reproduced below) which have recently been adopted by the appropriate official bodies in the United States and in this country.

AN AMERICAN RESOLUTION.

" According to the *Journal of the American Medical Association* (1944, 125, 977) the Board for the Co-ordination of Malarial Studies adopted the following resolution concerning the relative value to the armed forces of mepacrine (quinacrine hydrochloride USP), quinine and totaquine (USP) :

"'On the basis of controlled quantitative studies in civilian, Army and Navy establishments, the evidence at hand justifies the following statement :

" 1. *In the suppressive therapy.*—Mepacrine (atabrine) has proved to have all the animalarial properties ascribed to quinine in the suppression of malaria during and subsequent to exposure to infected mosquitoes. Effective suppression can be accomplished over long periods of time by proper use of mepacrine. Available evidence indicates that this end may be achieved without danger to the individual.

" Earlier reports indicated a significant incidence of gastro-intestinal disturbances in certain groups of men receiving suppressive mepacrine therapy. For practical purposes these adverse reactions can be avoided by proper administration of the drug. Quinine, in doses adequate to assure suppression of malaria equivalent to that produced by mepacrine in the dosage currently used by the armed forces, is frequently attended by symptoms of cinchonism.

" Mepacrine has been demonstrated to prevent consistently the development of falciparum malaria when the drug is administered in proper dosage before, during and after exposure.

" 2. *In the therapy of the acute attack.*—Experience in the past two years has demonstrated conclusively that mepacrine (atabrine) when properly administered is fully as effective as quinine in the termination of the acute attack and is safer than quinine. The intramuscular injection of mepacrine is highly effective in securing a rapid therapeutic response. Evidence is not at hand to decide on the relative merits of mepacrine administered intramuscularly as compared with quinine administered intravenously in patients with fulminating cerebral malaria.

" 3. *In the therapy of vivax malaria.*—Neither mepacrine nor quinine can be relied on to prevent relapses in vivax malaria following the discontinuation of therapy, although the interval between attacks is significantly longer following mepacrine than following quinine in the dosage schedules currently used by the armed forces.

"4. *In the therapy of falciparum malaria.*—There is convincing evidence that mepacrine not only suppresses the clinical symptoms of falciparum malaria but also cures this malignant form. The evidence of a similar curative effect of quinine is not conclusive.

"5. *Totaquine* (*USP*).—Because of its content of crystallisable cinchona alkaloids, totaquine (USP) has activity which approximates to that of quinine and therefore can be used as a substitute for quinine when given orally. The antimalarial activity of totaquine (USP) is dependent on the amount of crystallisable alkaloids in the preparation rather than on the specific amount of each individual alkaloid. Gastrointestinal disturbances occur more frequently following the use of the present totaquine (USP) than they do following the use of quinine or mepacrine.

"On the basis of the foregoing statement it is resolved: (1) that no advantage, and possible disadvantage, would accrue to the armed forces were quinine or totaquine to replace mepacrine for the routine suppression and treatment of malaria. (2) That the large-scale production of quinine or totaquine is not now considered a matter of importance for the management of malaria among Army and Navy personnel. It is possible that a supply of totaquine in excess of the present stockpiles may be required for therapy in civilian populations temporarily under the jurisdiction of the armed forces in occupied territory where immediate dissemination of information concerning the use of mepacrine (atabrine) is not practicable. In this connexion it should be kept in mind that after the war the overall need for all established antimalarial drugs will continue to be great.

"The personnel of the Board is: R. F. Loeb (chairman), W. M. Clark, R. G. Coatney, L. T. Coggeshall, F. R. Dieuaide, A. R. Dochez, E. G. Hakansson, E. K. Marshall, jun., O. R. McCoy, F. T. Norris, W. H. Sebrell, J. A. Shannon, and G. A. Carden, jun. (secretary).

British Conclusions.

"The above resolution was considered by the Drug-Prophylasis and Therapy Subcommittees of the Medical Research Council Committee on Malaria at a joint meeting on August 23, 1944. The members of these subcommittees are: Major-General A. G. Biggam (chairman), Brigadier F. A. E. Crew, F.R.S., Colonel S. P. James, F.R.S., Dr. W. D. Nicol, Lieut.-Colonel B. G. Maegraith, Colonel C. S. Ryles, Mr. P. G. Shute, Brigadier J. A. Sinton, F.R.S., Air Marshal Sir Harold Whittingham, and Dr. F. Hawking (secretary). The various items were discussed and it was agreed that British experience and the extensive investigations carried out in Australia, under the direction of Brigadier N. Hamilton Fairley, led to the same conclusions as those reached in America. In particular, the subcommittees endorsed the resolution that if quinine or totaquine replaced mepacrine for the routine suppression and treatment of malaria, the change would not be advantageous and might possible be disadvantageous.

"It is not possible during war-time to disclose all the extensive investigations upon which these official American and British resolutions concerning the relative merits of mepacrine and quinine have been based, but when peace returns full details will doubtless be published in the scientific press. Meanwhile the position may be summed up by saying: under proper administration mepacrine is no more liable to cause serious toxic effects than quinine is; mepacrine is as effective as quinine in the therapy of vivax malaria, but neither compound will prevent relapses at a later date; mepacrine if properly given will practically always suppress and cure falciparum malaria, while the action of quinine in this respect is less certain.

" Accordingly it must be realised that mepacrine is not an inferior substitute for quinine forced upon us by the loss of Java, but it is a more effective agent against malaria which would still be employed even if the supplies of quinine were unlimited."

AUERBACH, M. E. & ECKERT, H. W. **The Photofluorometric Determination of Atabrine.** *J. Biol. Chem.* 1944, Aug., v. 154, No. 3, 597–603. [17 refs.]

The method described is a modification of that of MASEN (*J. Biol. Chem.*, 1943, v. 148, 529) and BRODIE and UDENFRIEND [this *Bulletin*, 1944, v. 41, 453]. The chief new point is the intensification of the fluorescence of mepacrine by means of caffeine sodium benzoate.

" *Technique for Blood.*—Pipette 5 ml. of oxalated whole blood into a 125-ml. Squibb separatory funnel containing 10 ml. of 5 per cent. disodium phosphate solution. Add 30 ml. of ether and shake for three minutes. Very little emulsion forms. Allow the two layers to separate and tap off the aqueous layer. Wash the ether layer with three portions of about 5 ml. of 0·05 n sodium hydroxide, and once with 5 ml. of distilled water.

" To the ether layer add 5 ml. of 0·1 n sulphuric acid and shake for 30 seconds. Collect the acid extract in a 25-ml. glass-stoppered graduated cylinder. Extract the ether with a second 5-ml. portion of acid, adding the second extract to the first. Wash down the stopper with about 2 ml. of water, shake to collect as much as possible of the aqueous layer in the bottom of the funnel, and add this final wash to the collected acid extracts. Dilute to the 15 ml. mark with water. Add 1 ml. of the caffeine reagent, stopper, and mix. The solution is then ready to read in the fluorometer. The standard for comparison consists of a mixture of 1γ of atabrine (1 ml. of diluted standard) with 10 ml. of 0·1 n H_2SO_4 and 1 ml. of caffeine reagent diluted to 16 ml. with water. Deduct from all readings the apparent fluorescence of a blank consisting of 10 ml. of 0·1 N.H_2SO_4 plus 1 ml. of caffeine reagent diluted to 16 ml. with water."

The caffeine reagent is prepared by dissolving 10 gm. of caffeine sodium benzoate in 30 ml. water and 40 ml. 95 per cent. ethanol; add 20 ml. of diethanolamine, dilute to 100 ml. with water and mix. The readings are made with a Coleman No. 12 photofluorimeter. 5 ml. samples of blood containing 0·1 microgramme of mepacrine can be analysed satisfactorily. If the room temperature is above 24°C. the sensitivity is diminished.

[For many additional technical details the original should be consulted. Dr. E. J. KING, who has tried this method, states that difficulty may often be encountered owing to fluorescent substances present as contaminants in caffeine sodium benzoate and in diethanolamine.] *F. Hawking.*

UNTI, O. Método simples e rápido para a dosagem do quinino no sangue. (Nota preliminar.) [**A Simple and Rapid Method for the Estimation of Quinine in Blood. (Preliminary Note).**] *Arquivos de Hig. e Saúde Pública.* São Paulo. 1943, Sept., v. 8, No. 19, 75–82. English summary.

One cubic centimetre of blood is dehydrated by mixture with 3 gm. desiccated sodium sulphate. It is triturated and transferred to a 25 cc. flask and four to five drops of ammonia are added to make it alkaline. The alkaloid is extracted with 8 cc. chloroform 80 per cent.: ether 20 per cent. on a water bath at 65°C. The flask is cooled and the supernatant is decanted into another flask; this operation is repeated twice with 5 cc. quantities of the same mixture and then the combined supernatant fluids are evaporated to dryness. The residue is dissolved in 2 per cent. sulphuric acid in water and made up to the original volume of 1 cc. The concentration of quinine is estimated by comparing the

fluorescence obtained with that of known solutions of quinine sulphate. The sensitivity of the method depends upon the apparatus used to detect the fluorescence [and presumably upon the volume of blood originally taken]. The author could detect quinine in a concentration of 1 in 6 millions, *i.e.* 0·17 micrograms per cc. of blood. When quinine in known amounts was added to blood, the loss in recovery was between 10 and 15 per cent. Quantities of blood as small as 0·2 cc. may be used. The time required for an assay is about 25 minutes. [Abstract prepared from English summary.] *F. Hawking.*

McGregor, I. S. & Loewenstein, A. **Quinine Blindness.** *Lancet.* 1944, Oct. 28, 566-7.

A most interesting case is described of a man aged 37 who had taken quinine over a period of years in small doses without any ill effects except tinnitus and transient deafness. About 360 grains were administered within a period of 24 hours. He became deaf and totally blind. Very slow and imperfect recovery took place and, although at times the central vision was good, his field of vision remained restricted. It was necessary for him to be rehabilitated as a person with grossly defective vision. The authors state that the man did not lose his eyesight because he had an idiosyncrasy ; he lost it because he was given massive doses of quinine. To avoid such catastrophe quinine dosage should be cautious and the drug stopped if visual symptoms arise. [As this patient had deafness and tinnitus on previous occasions it would be wise to include attention to these symptoms in this important warning.] *W. J. B. Riddell.*

i. Good, R.; ii. Blacklock, D. B. **Arsenic in Malaria.** [Correspondence.] *Brit. Med. J.* 1944, Oct. 28, 579 and Nov. 18, 671.

i. In the author's experience a single intravenous injection of 0·45 gm. of neoarsphenamine always terminated artificially induced benign tertian malarial infection ; he suggests that it might be tried in cases of naturally acquired malaria that " do not respond to quinine etc."

ii. Blacklock refers to studies made from 1917 to 1920 by a team of workers at the Liverpool School of Tropical Medicine [this *Bulletin*, v. 11 to v. 15]. These workers found [*ibid.*, 1919, v. 13, 79] that neoarsphenamine had a rapidly effective action on *Plasmodium vivax* infections but the ultimate results were most disappointing as nearly all cases relapsed ; a combination of neoarsphenamine and quinine however [*ibid.*, 1920, v. 15, 121] was more effective than either drug alone. In infections with *P. falciparum* [*ibid.*, 1919, v. 14, 281] or *P. malariae* [*ibid.*, 1920, v. 15, 121] neoarsphenamine had no good effect. In one series of cases, however [*ibid.*, 1919, v. 13, 289] the administration of Liq. Arsenicalis B.P. after two initial intramuscular injections of 15 grains of quinine bi-hydrochloride, prevented relapses during the observation period of 60 days. Of 31 cases so treated only four (12·5 per cent.) relapsed, while in 30 control cases treated with the two quinine injections only, 21 (70 per cent.) relapsed. The cases treated had long-standing infections with frequent relapses in spite of much treatment with quinine. *J. F. Corson.*

Neeman, M. **Configuration and Antiplasmodial Activity.** [Correspondence.] *Nature.* 1944, Oct. 28, 550.

Sliwensky, M. Beitrag zur Malariabekämpfung im heutigen Bulgarien. [**Control of Malaria in Bulgarian occupied Thrace and Macedonia.** [*Deut. Tropenmed. Ztschr.* 1943, Dec. 1, v. 47, No. 23/24, 613–24, 6 figs. [10 refs.]

The author reviews the researches of various workers on the races of *Anopheles maculipennis* in the Balkan Peninsula during the past twelve years or so, most

of which have been recorded in this *Bulletin* [for example, 1935, v. 32, 101 ; 1936, v. 33, 258 & 762 ; 1937, v. 34, 166 ; 1938, v. 35, 137, 138].

From December 1941 to May 1942, an antimalaria campaign was carried on by a team of workers in Thrace and Macedonia, bordering on the Aegean Sea. The chief measures were the destruction of hibernating adult mosquitoes in houses and cattle sheds, destruction of mosquito larvae by oiling or by stocking the pools with *Gambusia* fish, and treatment of malaria carriers. Adult mosquitoes were sought for with torches and sprayed with " Fly-Tox." Malaria carriers were given a 10-day course of quino-plasmoquine, three tablets daily ; the results were very satisfactory.

A case of blackwater fever occurred in March 1943 in a soldier who had had benign tertian fever in the previous summer ; the patient recovered after treatment with " Campolon " [a liver extract] and " Cantan " [vitamin C], and diuretin [theobromine and sodium salicylate] given in tea. [No mention is made of a blood examination in this case.] *J. F. Corson.*

STRIBERNY, L. Die Malariabekämpfung und ihre Resultate im bulgarischen Heere in den Jahren 1942 und 1943. [**The Antimalaria Campaign in the Bulgarian Army.**] *Deut. Tropenmed. Ztschr.* 1943, Dec. 1, v. 47, No. 23/24, 624–9.

The chief cause of the great spread of malaria in the Bulgarian army was the heavy infection of the population of the newly acquired countries of Thrace and Macedonia. A study of the biological and epidemiological conditions formed the foundation for the application of control measures.

The general result of the antimalaria campaign in the army in 1941 was very good : from May 1st to October 31st, the average incidence of malaria in the garrison troops was 18·21 per thousand, while in the previous year it was 45·8 per thousand. Among the mobilized troops and labour battalions in heavily infected areas of Thrace, and near the Turkish border, the average incidence in 1941 was 94·77 per thousand and in 1942 it was 121·16 per thousand. This is much less than during the Great War of 1915–1918, when subtertian malaria was the chief form of the disease.

The usual measures were applied and are given in some detail ; they included filling up or oiling breeding places, spraying dwelling rooms, the use of mosquito gauze, blood examinations, treatment of patients and malaria carriers, and prophylactic administration of quinine (1·2 gm.) or (for airmen) atebrin (2 × 0·1 gm.) twice a week. The results were considered to be good. *J. F. Corson.*

KHAN, H. **On the relative Value of certain Larvivorous Fishes from the Punjab, with Notes on their Habits and Habitats.** *Indian J. Vet. Sci. & Animal Husbandry*, 1943, Dec., v. 13, Pt. 4, 315–25. [23 refs.]

GAJEWSKI, J. E. & TATUM, A. L. **A Study of the Mechanism of Relapse in Avian Malaria.** *J. Infect. Dis.* 1944, Mar.–Apr., v. 74, No. 2, 85–92. [21 refs.]

It is well known that various factors conduce to relapse in malaria in which there is a return of fever together with the reappearance of parasites in the peripheral blood. Of the causes of relapse there are acute infections of other sorts, exposure to cold, exhaustion, anaesthesia, surgery, changes in climate and removal from low to high altitudes. Spontaneous relapses have been noted in avian malaria and these may vary with the season, or occur more frequently when barometric pressure is low. Relapses have been produced by the injection of parasitized or normal erythrocytes or foreign blood, or by ultra-violet radiation, especially when resistance has been lowered by intercurrent infections.

It has recently been shown that the relapse following intravenous injection of foreign avian washed erythrocytes is associated with blockage of the reticulo-endothelial system by these erythrocytes. Injection of epinephrine may also bring about relapse. Sudden reduction of the number of erythrocytes, or haemolysis, following injections of phenylhydrazine, is another cause. HEGNER and his co-workers [this *Bulletin*, 1939, v. 36, 338], having shown that the merozoites of certain avian malarial parasites had a preference for young rather than old erythrocytes, considered it possible that the severity of infections would vary with the proportion of young to old erythrocytes present in the blood during the developing infection. As it was known that exposure to an atmosphere rich in oxygen depressed red cell production, while an atmosphere poor in oxygen stimulated it, HEGNER and DOBLER (*Amer. J. Hyg.*, 1941, v. 34, Sect. C, 14), studied the infection in birds during exposure to an atmosphere with high oxygen content. As they predicted, the reduction in the young erythrocytes was associated with infections of reduced severity. The converse condition was not studied by them. In the present paper the authors give an account of experiments in which the influence of an atmosphere of low oxygen content on latent infections in bird malaria was under observation.

It was found that an oxygen content of approximately 75 mm. Hg partial pressure brought about relapse in two to seven days in all of more than 100 canaries with latent *P. cathemerium* infection. At the peak of the relapse the infection was less intense than at the peak of a primary attack. After two to four days the infection declined till at the end of a week parasites were no longer detectable. The mortality rate in the primary infections was about 30 per cent. After several weeks the birds were again exposed to the low oxygen atmosphere. This time only 50 per cent. relapsed, usually with slight infections. The exposure, when repeated a third time, caused no relapses, while of 10 such birds two were found to be susceptible to re-inoculation with the same strain of parasite. It would appear that in these two birds a cure had been effected.

It was found that birds in which the primary attack had been cut short by administration of plasmoquine, atabrine or quinine relapsed earlier and more severely when exposed to the low oxygen atmosphere than did birds which had survived the primary infection without drug treatment. This was particularly noticeable in the case of birds which had received plasmoquine. It was evident that birds in which the infection had run its natural course had in some manner developed a greater resistance than the treated birds. It was also observed that if at the first exposure, while the parasite count is rising, the bird is removed from the low oxygen chamber, the count falls promptly. On re-introduction to the chamber the count rises again. This procedure, with like result, was repeated four or five times. It seemed evident that the low oxygen in some way interfered with progress of phagocytosis.

From the work of the TALIAFERROS [this *Bulletin*, 1930, v. 27, 288] and CANNON [*ibid.*, 1931, v. 28, 494] it was known that the injection of large numbers of infected erythrocytes into the blood stream of "latent birds" is followed by their rapid disappearance from the blood as a result of phagocytosis by the macrophages of the liver, spleen and bone marrow. These observations were confirmed by the authors of the paper under review. They also showed that an exposure of 16 hours to the low oxygen atmosphere brought about a condition of hyperglycaemia. If at this stage infected erythrocytes were injected intravenously there was not the rapid disappearance from the circulation as in "latent birds" not exposed to low oxygen. A similar failure to disappear occurred when hypodermic injections of epinephrine were made an hour before the infected erythrocytes were injected. As in the case of low oxygen exposure, injection of epinephrine gives rise to a condition of hyperglycaemia. A similar

result was obtained when hyperglycaemia was produced by the hourly enteral administration of 0·5 cc. of 50 per cent. glucose solution.

In seeking for an explanation of these results the authors note that there is very little direct evidence of the presence of antibodies in malarial infection. There is no doubt, however, that some substance sensitizes the phagocytes to the extent that they remove the parasites from the peripheral blood. This substance is present in small amount only—just sufficient to keep the parasites at the low level characteristic of latency. It is postulated that under low oxygen tensions or as a result of hyperglycaemia the formation of the antibody is reduced to such a degree that the phagocytes are no longer capable of keeping the parasites at the low level. With continued low oxygen exposure this phase passes and parasites are again reduced. This could be interpreted as indicating a condition of hyperimmunity. Each relapse may be considered to be similar in action to injections of parasites which Boyd and Kitchen [this *Bulletin*, 1943, v. 40, 818] have shown produce an increase in immunity in patients who have had their primary attack of malaria. The instances noted above in which the infection was cut short by drug treatment may similarly be explained. It might be urged that exposure to an atmosphere with a high oxygen content should lead to an increased degree of immunity but it is argued that such an increase in the oxygen does not bring about a corresponding saturation of the haemoglobin and depresses reticulocyte formation only to a slight extent. This study, however, is outside the scope of the paper.

C. M. Wenyon.

Caldwell, F. E. **In Vitro Effects of High Temperatures on Avian Malarial Parasites.** *J. Infect. Dis.* 1944, May–June, v. 74, No. 3, 189–205, 2 figs. [Numerous refs.]

Apart from the observation of L. G. Taliaferro (*J. Prev. Med.*, 1928, v. 2, 515) that exposure of *Plasmodium cathemerium* to a temperature of 0·5°C., *in vitro*, resulted in a delay in the asexual development in proportion to the time of exposure, very little work has been done on the modifications in periodicity which can be produced by factors acting directly on the parasites. On the other hand many studies have been made on the modifications in the development of the parasites which result from changes in the environment or physiology of the host. To obtain further information on the effects of *in vitro* exposure it was decided to study strains of *P. cathemerium* which had resulted from exposure to sub-lethal temperatures. Working with the 3H1-2 strain it was first determined that it possessed a high degree of synchronism in asexual reproduction and had the ability to give rise to large numbers of gametocytes, as determined by its ability to produce oöcysts in *Culex pipiens*. Further experiments indicated that the thermal death point was reached by exposing infected blood in capillary tubes to a temperature of 50°C. for eight minutes and that strains could be started in canaries inoculated with blood exposed to this temperature for seven minutes. Three such strains were studied. The first of these (3H1-3) revealed a marked disturbance in the synchronism of schizogony and gametocyte production, which persisted in a number of birds for three months. During a further series of passages over 6½ months the strain had regained its original characters. The second strain (3H1-4) after one passage showed disturbance in the synchronism of schizogony and a marked reduction in gametocyte production. A further 6½ to 7 months' study revealed a persistence in the disturbance to asexual reproduction, while gametocyte production was reduced to such a level that attempts to infect *Culex pipiens* were unsuccessful. The third strain (3H1–5) did not at any time show departure from the characters of the original strain (3H1–2). In addition

to discussion of the main results of the experiments the paper gives a historical review of relevant literature and details of the technique employed and the methods adopted for estimating changes in the cycle of development of the parasite. *C. M. Wenyon.*

REDMOND, W. B. **Mosquito Transfer of the Pigeon Strain of** *Plasmodium relictum*. *J. Infect Dis.* 1944, May–June, v. 74, No. 3, 184–8.

A strain of *Plasmodium relictum* discovered in a pigeon was inoculated to pigeons and canaries. The strain in canaries was re-inoculable to pigeons and there did not appear to be any appreciable differences between the parasites in the two hosts. Experiments described in this paper relate to attempts to transmit these infections by *Culex pipiens*. It was found that the infection was readily transmitted from canary to canary but was not transmitted from canary to pigeon nor from pigeon to pigeon. After passage of the strain from canary to canary through the mosquito, 12 pigeons were inoculated intravenously. In only two of these were a few parasites seen. Later these birds contracted heavy infections when inoculated with the strain which had not been transmitted by *Culex pipiens*. Similar experiments with like results were carried out by injection of sporozoites dissected from infected mosquitoes. The author considers that the experiments indicate that passage through the mosquito has produced genetic alterations in the strain of parasites employed.

C. M. Wenyon.

BLACKWATER FEVER.

BENIANS, T. H. C. **Blackwater Fever and Vascular Collapse.** [Correspondence.] *Lancet.* 1944, Nov. 18, 674–5.

This letter, referring to the generalized vascular disturbance described in blackwater fever by MAEGRAITH and FINDLAY [see this *Bulletin*, 1945, v. 42, 12] draws attention to the association of intravascular haemolysis and vascular dysfunction in conditions, such as Raynaud's disease and paroxysmal cold haemoglobinuria, where auto-antibodies have been found.

Some original experiments are described briefly, in which intravenous injection into rabbits of a small amount of high-titre cold-agglutinating serum from a patient with Raynaud's disease proved lethal from "anaphylactic shock," with haemolysis and vascular spasm. "Average [human] serum has no such effect on them." An attempt at prophylaxis, by injecting suspensions of lecithin, as an alternative "antigen," had a considerable degree of success.

The author suggests that some such measure might be useful clinically, in these various conditions, including blackwater fever, although lecithin, itself a lytic agent, might not be appropriate. *E. G. L. Bywaters.*

BLACKIE, W. K. **Blackwater Fever.** *Clin. Proc.* Cape Town. 1944, July–Aug., v. 3, No. 6, 272–312. [36 refs.]

TRYPANOSOMIASIS.

VAN HOOF, L. HENRARD, C. & PEEL, E. Morphologie des trypanosomes polymorphes des mammifères dans les glandes salivaires de *G. palpalis*. [**Morphology of Polymorphic Mammalian Trypanosomes in the Salivary Glands of** *G. palpalis*.] *Rec. Travaux Sci. Méd. Congo Belge.* Léopoldville. 1944, Jan., No. 2, 204–19, 3 pls.

This paper deals with the vexed question regarding the differential diagnosis of the three polymorphic mammalian trypanosomes, *Trypanosoma gambiense*, *T. rhodesiense* and *T. brucei*. Though so different in their host-parasite relationships and clinical manifestations, the blood forms of these parasites are morphologically indistinguishable. It is true that at one time it was held that *T. rhodesiense* and *T. brucei* differed from *T. gambiense* in the presence of the " posterior-nuclear " forms in experimental infections of laboratory animals, but the finding of similar forms in unquestionable strains of *T. gambiense* (first demonstrated in East Africa and subsequently in West Africa) invalidated this criterion, since the difference between the two subgroups—*T. rhodesiense* with *T. brucei*, on the one hand, and *T. gambiense*, on the other—proved to be merely a quantitative and fluctuating character. From the purely zoological point of view, therefore, these three parasites could hardly be regarded as independent species but rather as biological races of a single species [see this *Bulletin*, 1944, v. 41, 150].

The Belgian authors have turned to the stages of development of these trypanosomes in the salivary glands of the tsetse-fly for a solution of this problem. In the course of transmission experiments with *Glossina palpalis* they have observed certain peculiarities in the salivary stages of development of the three polymorphic trypanosomes which can serve to differentiate infections with *T. gambiense*, on the one hand, from infections with trypanosomes of the *T. rhodesiense-brucei* subgroup, on the other, both in fresh and in stained preparations. Although all the stages of development in the salivary medium are identical in these three tryanosomes, and therefore morphologically indistinguishable, the infections can be readily differentiated by the distribution, relative numbers and dimensions of the various developmental forms.

The observations recorded in this paper were based on four strains of *T. brucei*' two of *T. rhodesiense* and more than 100 of *T. gambiense*. The differential characters of the two subgroups of trypanosomes, as seen in the salivary medium, are given in the table below, which has been compiled from the table adduced in the original paper and from data given in the text :

The fact that the salivary forms of *T. brucei* and *T. rhodesiense* are indistinguishable from each other, but differ from those of *T. gambiense*, is also used as an argument in support of the view that the first two species are more closely related and form a subgroup independent of *T. gambiense*. Incidentally, the authors mention an experiment in which a volunteer was inoculated with one strain of *T. brucei* but failed to acquire an infection. The paper is illustrated by four plates of figures.

[Among the developmental forms described in this paper, some, like the vacuolated globular ones and those showing multiple division, would appear to be abnormal : such aberrant forms occur in various other trypanosomes both in the vertebrate and in the invertebrate hosts. Indeed, the authors themselves do not attach any other significance to them. However, if certain atypical forms are more commonly found in some polymorphic trypanosomes than in others, their recognition is undoubtedly of diagnostic value. Nevertheless, since the differences between the two subgroups are purely relative, the three species of polymorphic trypanosomes must still be regarded as morphologically identical.

TABLE.

	T. gambiense	*T. rhodesiense* and *T. brucei*
In fresh preparation	Massive infection, extending throughout the salivary gland. Trypanosomes grouped in bunches or tufts. Long and slender forms in the ducts. Free forms in the gland or in the lumen of the excretory duct: these are rarely the long proventricular forms but usually short forms resembling the stumpy blood forms. Globular vacuolated forms are rare.	Infection not so dense, sporadic, sometimes leaving long stretches of the salivary gland free. Trypanosomes more frequently isolated than grouped in bunches; when assembled together they do not form tufts characteristic of *T. gambiense*. The ducts usually contain small short motile forms; in the lumen there are free short forms, very rarely long forms. Globular vacuolated forms are more numerous and larger than in *T. gambiense*.
In stained preparation	Bunches of trypanosomes and crithidial forms, attached to each other by the posterior (aflagellar) ends. Isolated trypanosomes and crithidial forms, rarely vacuolated; but, when present, the vacuole is small. Few rounded forms with large vacuole, 1 or 2 nuclei, and 1 or 2 flagella.	Protoplasmic masses of syncytial appearance, with multiple nuclei and flagella. Isolated trypanosomes and crithidial forms, frequently vacuolated, the vacuoles being large. Numerous rounded forms with very large vacuole, sometimes with parallel filaments resembling mitotic spindle. (These are the most characteristic forms in the *brucei-rhodesiense* subgroup).

It is stated that the salivary forms do not vary with the host from which the tsetse became infected, and that in all strains of known origin the differential diagnosis of the polymorphic trypanosomes conforms to the scheme outlined above.

Furthermore, though the authors insist on the infallibility of their method of differentiation, several facts mentioned in the paper appear to be contradictory. Thus: (1) two out of three Tanganyika strains of *T. brucei*, used in DUKE's experiments (this *Bulletin*, 1933, v. 30, 469) produced in tsetse-flies *massive* infections of the salivary glands; (2) the authors note that, in two of their own strains of *T. brucei*, the proportion of sparse salivary infections was 46 and 54 per cent. respectively, from which it is evident that in both cases almost half of the infections in the flies must have been heavy; (3) the authors found that a Uganda strain of *T. rhodesiense* had all the characteristics of *T. gambiense* in the salivary glands of the tsetse. On account of this and because the strain in question occurred outside the endemic area of *T. rhodesiense* the Belgian authors express some doubt regarding the identity of this strain. However, if the strain in question is from case "Okero," described by DUKE (this *Bulletin*, 1931, v. 28, 346)—as it appears to be—it would seem that it originally showed all the characteristic features of *T. rhodesiense*.]

C. A. Hoare.

CHORLEY, T. W. *Glossina palpalis fuscipes* **Breeding away from Water (Diptera).** *Proc. Roy. Entom. Soc. of London.* Ser. A. General Entom. 1944, Mar. 28, v. 19, Pts. 1–3, 1–4.

It appears that there are no clear records of *Glossina palpalis* breeding more than a mile from water. If conditions of vegetation and climate are suitable, the author finds that it may breed many miles from water.

In Busoga, Uganda, there are areas of dense humid forest, broken up by elephant tracks, which provide small openings and mixed light and shade, suitable to this fly. In this, at distances up to 12 miles from water one may find considerable numbers of adults and pupae of *Glossina palpalis fuscipes*. In the author's view the general limitation of this insect to waterside forest is not due to the presence of animals which serve as food supply (and which are often common in areas far from water, uninhabited by this fly), but to climatic conditions, of which he names shade and humidity. *P. A. Buxton.*

POTTS, W. H. **Tsetse Hybrids.** [Correspondence.] *Nature*, 1944, Nov. 11, 606–7.

In 1936 the author crossed various species of *Glossina* with the idea that if the hybrids were sterile the method might be tried as a measure of control. As the females were not bred from isolated single pupae the possibility of fertilization of the newly hatched females by newly hatched males of the same species could not be excluded and the results were therefore not published [a brief mention is made by the author in *Bull. Entom. Res.*, 1937, v. 38, 135]. Since then hybrids following the mating of *G. morsitans* with *G. swynnertoni* have been obtained by VANDERPLANK [below] and a recent examination of the male " hybrids " of the author's earlier experiments has shown that they differ from both parents. An account of those experiments is therefore now given.

Three out of 28 female *G. swynnertoni*, paired with *G. morsitans* and surviving for 21 days or more, produced one, two and four pupae respectively, and from these two male and two female flies emerged, and a fifth fly escaped before its sex was known. They all resembled the female parent. Three out of 40 female *G. morsitans*, paired with *G. swynnertoni*, produced two, one and two pupae, respectively, and two males and three female flies emerged. These all resembled the male parent so they must have been hybrids. The external characters of *G. swynnertoni* are dominant. The author calls the former hybrids (*G. morsitans* father) " morsitoni " and the latter (*G. swynnertoni* father) " swynnertans ". The following further crossings were made :—

1 " morsitoni "	female × *G. swynnertoni* ...	4	pupae.
1 " morsitoni "	female × *G. morsitans* ...	4	,,
2 " swynnertans "	female × *G. swynnertoni* ...	5	,, (3 and 2).
1 " swynnertans "	female × " morsitoni " ...	0	,,

From these 13 pupae seven imagines emerged—five females and one male (one escaped). One female was crossed with *G. swynnertoni*, one with *G. morsitans*, two with " morsitoni," and one with the single male hybrid of the second generation ; none produced offspring. As a control of the laboratory conditions each species was still breeding, between sexes of the same species, after four generations.

As cross-mating seemed to occur less readily than mating within the species, and as the hybrids were so few, the experiment was abandoned as not fulfilling the conditions necessary for control of the fly in the field. Recent experiments by Vanderplank [below] have led to a further consideration of the subject, and it is proposed to attempt to control *Glossina* by introducing large numbers of pupae of the alien species into country where the indigenous species is not

plentiful; the indigenous species might be exterminated by sterility and the introduced species might die out owing to unsuitable environment.

Experiments to cross *G. morsitans* and *G. swynnertoni* with *G. pallidipes*, *G. palpalis* and *G. austeni*, had negative results, but the numbers of flies used were small. [Stuhlmann (*S. S. Bulletin*, 1908, v. 1, 93) claimed to have observed parthenogenesis in tsetse flies twice; Kleine (*ibid.*, 1909, 452) failed to obtain offspring by crossing *G. palpalis* and *G. morsitans* (his "*G. morsitans*" were probably *G. swynnertoni* from pupae from Ikoma); see also Corson, this *Bulletin*, 1932, v. 29, 837.] *J. F. Corson.*

Vanderplank, F. L. **Hybridization between Glossina Species and suggested New Method for Control of certain Species of Tsetse.** [Correspondence.] *Nature*. 1944, Nov. 11, 607–8.

The author crossed *G. morsitans* and *G. swynnertoni*, each species being bred from pupae obtained in an area from which the other species was absent. The flies were hatched from pupae kept singly in tubes or were isolated immediately on emergence from collections of pupae. The results are shown in the table:—

Nature of cross	Females inseminated; per cent.	Inseminated females living over 21 days which produced pupae; per cent.	No. of pupae per inseminated female living over 21 days	Average life of females; days
G. morsitans ♂♂ × *G. swynnertoni* ♀♀ (experiment)	92 (37)	10 (31)	0·1 (3)	70 (40)
G. swynnertoni ♂♂ × *G. swynnertoni* ♀♀ (control)	80 (12)	100 (7)	2·4 (17)	61 (12)
G. swynnertoni ♂♂ × *G. morsitans* ♀♀ (experiment)	96 (45)	24 (33)	0·4 (13)	68 (47)
G. morsitans ♂♂ × *G. morsitans* ♀♀ (control)	76 (19)	100 (10)	4·0 (40)	75 (9)

N.B.—The numbers in brackets give the totals on which the percentages or averages are based; these are not the same throughout the table, as some females, counted as inseminated on the evidence of dissection did not live long enough to produce pupae, and also some of the females which were used to give the average life were not dissected to show insemination.

Insemination occurred as readily in the cross matings as with the same species where no choice was offered, but the cross matings produced far fewer pupae.

In other experiments it was found that *G. pallidipes* did not readily mate with *G. morsitans* and *G. swynnertoni*; no successful mating took place between female *G. pallidipes* and other species, one male *G. pallidipes* mated with but did not inseminate one *G. morsitans*, and four male *G. pallidipes* inseminated four *G. swynnertoni* but there were no offspring. When equal numbers of male and female *G. swynnertoni*, *G. morsitans* and *G. pallidipes* were mixed in a cage,

30×30×30 cm., mating between *G. swynnertoni* and *G. morsitans* occurred as readily as between the sexes of the same species and took place at random, but there were no cross matings with *G. pallidipes*.

The male hybrids have distinct genitalia and show affinities to the female parent; all the hybrids were similar to *G. swynnertoni* in external markings. Male hybrids inseminate females, both hybrids and non-hybrids, but there has been no offspring. Attempts to cross female hybrids with pure bred males of both species have failed. The average length of life of the hybrid females was 106 days—longer than that of their female parents. A few hours after a female is inseminated it is no longer attractive to males and will not permit further coitus.

A field experiment of releasing large numbers of *G. morsitans* in an isolated block of *G. swynnertoni* country has been begun.

The author hopes to publish further details of this work later. *J. F. Corson.*

NAIMAN, Dorothy N. **Effect of X-Irradiation of Rats upon their Resistance to** *Trypanosoma lewisi*. *J. Parasitology*. 1944, Aug., v. 30, No. 4, 209–28, 9 figs. [38 refs.]

LEISHMANIASIS.

SHORTT, H. E. **Résumé of Recent Research on Kala-Azar with special reference to Assam.** *Proc. Ann. General Meeting of Assam & Northern Bengal Branch Brit. Med. Ass., Shillong, 4th–7th November, 1943*, 30–39. 1944. Calcutta: Indian Tea Association.

This article, though containing no new material, is a very interesting one from the historical point of view. It gives a brief account of kala azar in Assam and then passes on to a review of the various investigations which have been carried out there and which led, in the first place, to the discovery of the nature of the mysterious disease, and finally to the establishment of the fact that the sandfly *Phlebotomus argentipes* is the vector. The names of all those who took part in the investigations, which extended over many years, are mentioned, and, coming from one who himself played a prominent rôle in the researches, the article may be accepted as historically accurate. It will be a most useful guide to all those who wish to follow the course of the laborious work, which has only recently been crowned with success by the transmission of kala azar to five out of five volunteers by sandflies which had been infected by feeding on cases of the disease. *C. M. Wenyon.*

FERRO-LUZZI, G. Studio sul kala-azar in Eritrea. [**Kala Azar in Eritrea.**] *Boll. Soc. Ital. di Med. e Igiene Trop.* (Sez. Eritrea). 1943, v. 2, No. 3, 5–13. English summary.

"The author describes 9 cases of kala-azar in adults (of whom 6 were Europeans living in Eritrea):

"This disease seems to be endemic in the two lowlands and clinically is very similar to that known in Europe and elsewhere."

HOU, P. C. **An Investigation of Kala-Azar and Sand-Fly Incidence in an Endemic Kala-Azar Area in the Western Part of Szechuen.** *Chinese Med. J.* 1943, Oct.–Dec., v. 61, No. 4, 279–80.

Clow, J. M. **Kala-Azar in Shensi Province.** *Chinese Med. J.* 1943, Oct.–Dec., v. 61, No. 4, 281–90.

In a preliminary note published in 1941 [this *Bulletin*, 1941, v. 38, 569] it was reported that kala azar was occurring in the province of Shensi. It was later noted that a case of the canine disease had also been observed. In the present paper 535 cases which have come under the author's supervision during 1940 and 1941 in Shensi are considered. Geographically Shensi is similar to the great plain of N. China, where kala azar is prevalent in the provinces of Hopei, Honan, Shantung and Kiangsu. The habits of the natives are similar to those in N. China and sandflies abound in the months of May and June. In Shensi kala-azar occurred sporadically but it now has become almost epidemic and constitutes a serious problem. Of the 535 patients seen in Shensi, 514 apparently contracted their infection in the Central Shensi area, many of them in and around Sian city. Some of the patients, mostly adults, came from neighbouring provinces. The disease, which is most frequently seen in children and young adults, conforms to the well-known classical descriptions. Diagnosis, according to the author, is best accomplished by sternal puncture. The chief complications were noma, necrosis of the upper and lower jaw, dysentery, pneumonia and acute granulocytopenia. For treatment various drugs were employed as follows—neostam (281 cases), neostibosan (35 cases), urea stibamine (12 cases), stilbamidine (a few cases). Of these drugs the last, in the small series treated, gave the most rapid response, though severe shock-like symptoms, of a transitory character, were not uncommon after the injections. Urea stibamine appeared to be more curative but more toxic than neostibosan, which was the least toxic of the drugs employed. Neostam occupied an intermediate position. Three gm. per 100 lb. of body weight is the total quantity of neostam recommended, but larger doses may be necessary, especially in children. Some patients who were cured received over 8 gm. without ill effect. Of 400 patients in whom treatment was completed, 15 per cent. were cured, 16·5 per cent. doubtfully cured, 52·2 per cent. improved and 16·3 per cent. relapsed, were moribund or died. *C. M. Wenyon.*

Sarrouy, C. & Gillot, F. Traitement rapide de la leishmaniose viscérale infantile par un nouveau dérivé stibie. [**Rapid Treatment of Infantile Kala Azar with a New Antimony Derivative.**] *Arch. Inst. Pasteur d'Algérie.* 1943, Mar., v. 21, No. 1, 28–37, 6 charts.

The authors report the successful treatment of nine cases of infantile kala azar in Algeria by means of the methyl-glucamine salt of para-amino-phenyl-stibonic acid, named pentastib. This compound has already been employed in veterinary practice and for the treatment of a few cases of kala azar [this *Bulletin*, 1944, v. 41, 109] in which it was administered intravenously. The authors of the present paper have found that the intramuscular injection of the drug in relatively large doses daily for a few days is followed by immediate response, as evidenced by the rapid fall in temperature, the disappearance of the parasites and the improvement in the condition of the blood. The best results were obtained when the quantity of the drug to be administered was spread over the minimum number of days. Thus it is recommended that for each kilogramme of body weight 0·07 gm. of the drug should be injected daily for four days, or 0·1 gm. daily for three days. Though in some cases the injections were followed by nausea or vomiting, the reactions were much less frequent than when the drug was administered intravenously.

C. M. Wenyon.

SARROUY, J., DENDALE, R., COMBE, P., ARNAUD, R. & GILLOT, F. **A Rapid Cure for Infantile Visceral Leishmaniasis by a New French Antimonial Derivative.** *Texas Reports on Biol. & Med.* 1944, v. 2, No. 3, 325–34, 6 figs. [12 refs.]

This is an account of the same work as that noticed above.

KIKUTH, W. Epidemiologie, Uebertragung und Therapie der Leishmaniasis interna. [**Epidemiology, Transmission and Treatment of Kala Azar**] *Münch. med. Woch.* 1943, Feb. 5, 104–8.

A general account.

BERBERIAN, D. A. **Cutaneous Leishmaniasis (Oriental Sore). I. Time required for Development of Immunity after Vaccination.** *Arch. Dermat. & Syph.* 1944, June, v. 49, No. 6, 433–5.

The artificial production of oriental sore at selected sites by inoculation of leishmania from another sore, or of cultures of leishmania, is now a recognized procedure in order to avoid the disfiguring sores which, in natural infections, appear on exposed parts of the body, particularly the face. Such artificially produced sores run a normal course and, as in the naturally acquired disease, are followed by complete immunity. The question arises how soon after the appearance of the sore is this immunity developed. Other observers have shown that during the development of one sore, inoculation of infective material may be followed by another, at the site of the second inoculation. To obtain further information on this subject the author produced oriental sore in a number of volunteers, and at varying intervals after the appearance of the sore inoculated them a second time. In a series of experiments when the duration of the first sore had been 123,136, 195 and 230 days, a second inoculation produced a second sore, proving that immunity had not been developed. When the first sores had lasted 242 and 300 days, the second inoculation produced no sores. It seems clear that till the developing papule ulcerates and commences to heal and the leishmania disappear naturally from the lesion, there is no immunity. This immunity is developed slowly and an individual inoculated for protective purposes is liable to acquire oriental sore naturally at any time during the long period required for development of this immunity. *C. M. Wenyon.*

FEVERS OF THE TYPHUS GROUP.

STEPHENSON, C. S. **Epidemic Typhus Fever and other Rickettsial Diseases of Military Importance.** *New England J. of Med.* 1944, Sept. 21, v. 231, No. 12, 407–13. [16 refs.]

CIMMINO, V. Studio sull'andamento della febbre ricorrente e del dermotifo in Asmara nel quadriennio 1939–1942. [**Typhus and Relapsing Fever in Asmara, 1939–42.**] *Boll. Soc. Ital. di Med. e Igiene Trop.* (Sez. Eritrea). 1943, v. 2, No. 3, 85–93. English summary.

"Typhus and relapsing fever are two endemic diseases in Asmara, that show epidemic recrudescence during the cold and rainy months of the year.

"The European population is frequently affected, but with less intensity than the natives.

"The epidemic period of typhus and relapsing fever are generally coincident."

MACCHIAVELLO, A. El tifo exantematico en el Ecuador. I. Estudio experimental de cepas asiladas en el Ecuador Interandino. [**Exanthematic Typhus in Equador : I. Experimental Study of Isolated Strains.**] *Rev. Facul. de Med.* Bogota. 1944, June, v. 12, No. 12, 694–709. [16 refs.] English summary.

The author, whose name is familiar in connexion with his method of staining, describes the first detailed investigation of typhus rickettsiae in Equador. The first strain examined was isolated in Quito by another observer, who passed it through guineapigs ; during the first three passages it behaved as a typical non-orchitic strain, but on the fourth passage it appeared to become strongly orchitic and so was regarded as murine. At the fifth passage it was submitted to the author, who found that the orchitis was caused by an intercurrent infection with *Salmonella typhi-murium*. Rickettsiae were still present in the vaginal scrapings but rats were found to be insusceptible to infection, and so the strain was regarded as being of the classical type.

In the course of 17 passages, in which 90 guineapigs were used, only 14 of the animals showed typical febrile curves, and in 11 of these rickettsiae were found in vaginal smears. Of the other guineapigs 32 died "spontaneously" and eight were used for immunity tests. None of the 14 with characteristic fever curves had scrotal reactions, and rickettsiae were found in very small numbers when they were present.

By using brain substance as the inoculating material, and by treating the animals with sulphathiazole, a typical non-orchitic strain was gradually isolated.

The author holds that there is no justification for regarding the terms orchitic and murine as synonymous ; some murine strains are orchitic, others are not. On the other hand he believes that it is quite justifiable to call classical strains non-orchitic, because even if some of these have originated from a murine strain they are in process of losing their orchitic properties through adaptation to the louse-man-louse mode of transmission.

Two strains sent by Prof. Patiño-Camargo from Colombia were also investigated. One of these originated from suspensions derived from lice found on a typhus patient. In the course of 14 passages through 48 guineapigs it was found that very few of the animals gave typical febrile responses ; most of them had slight irregular attacks, or completely inapparent forms of the infection ; though even in animals suffering from inapparent attacks rickettsiae could often be found in small numbers in vaginal smears, and the animals were found to have acquired immunity against other strains of typhus rickettsiae. During the later passages, when the laboratory temperature was lower, febrile reactions became more frequent. The second Colombian strain originated from the blood of a patient. This had been found by Prof. Patiño-Camargo to cause a scrotal reaction in 75 per cent. of the male guineapigs through which passages were made. The author carried out 18 passages of this strain, using 50 guineapigs, and none of the animals showed the slightest degree of scrotal reaction. When brain substance was used as the inoculating material the strain died out after five passages, but with tunica scrapings it was maintained. Its virulence was of the same low order as that of the other strain and its failure to cause orchitis could not be explained.

The author, however, suggests that the virulence of rickettsiae, both in guineapig passages and in human infections, may be influenced by temperature conditions, and that these may prove to be important factors in connexion with the epidemiology of typhus fever. *John W. D. Megaw.*

GIROUD, P. & PANTHIER, R. Au sujet du comportement du cobaye à l'inoculation péritonéale de virus typhique historique. [**The Response of the Guineapig to Peritoneal Inoculation with the Virus of Historic Typhus.**] *Ann. Inst. Pasteur.* 1944, May–June, v. 70, No. 5–6, 191–2.

GIROUD had already shown [this *Bulletin*, 1936, v. 33, 926] that the historic virus could cause an orchitic reaction in guineapigs kept on a deficiency diet, but the orchitic property of the strain could not be maintained in a definite manner. GIROUD and PANTHIER had also shown [this *Bulletin*, 1943, v. 40, 35] that when massive doses of historic virus were obtained by rabbit-lung passage (starting from a blood-clot suspension from a patient suffering from louse typhus), inoculated guineapigs developed periorchitis with abundant rickettsiae in the exudate.

The present investigations deal with two strains, the " Nicolle-Tunis-Rabat " strain, and one of recent origin from a patient who contracted a severe infection in North Africa.

The Nicolle strain caused a scrotal reaction in guineapigs when rabbit-lung suspensions were injected intraperitoneally, but behaved as a non-orchitic strain when brain and spleen suspensions were injected. Suspensions of spleen substance mixed with vaginal exudate caused orchitis up to the eighth guineapig passage, but the rickettsiae gradually became less numerous.

The other strain, of recent human origin, behaved in much the same way; when passages were made with vaginal and spleen material the orchitic property was maintained and rickettsiae were found in vaginal smears up to the fifth passage. This strain was known to be of the true epidemic type because it was not pathogenic to rats.

The authors maintain that the same strain of historic rickettsiae can behave either as a typically orchitic or as a typically non-orchitic strain according to the conditions in which it is maintained and passaged. The guineapigs used in the present experiments were of the European type, of variable weight, and poorly nourished; the authors' previous work was done with heavy, well-fed, agoutis (*Dasyprocta* sp.). *John W. D. Megaw.*

BEGG, A. M., FULTON, F. & VAN DEN ENDE, M. **Inclusion Bodies in association with Typhus Rickettsiae.** *J. Path. & Bact.* 1944, Jan., v. 56, No. 1, 109–13, 13 figs. (10 coloured) on 3 pls.

With reference to the abstract of this paper, in this *Bulletin*, 1944, v. 41, p. 838, the authors have requested the Bureau to explain that the coloured illustrations referred to in the abstract were microphotographs taken by the three-colour process, and not coloured drawings. This point is not specifically mentioned in the legends to the coloured illustrations.

ASCHENBRENNER, R. Die Herz- und Kreislaufstörungen beim Fleckfieber und ihre Behandlung. [**The Cardiac and Circulatory Disturbances in Typhus Fever, and their Treatment.**] *Klin. Woch.* 1943, Jan. 2, v. 22, No. 1, 1–8, 7 figs. [36 refs.]

There were 106 deaths in the 691 cases of typhus fever treated by the author in 1942. The chief cause of death was damage to the central nervous system (99 cases); this was accompanied by pneumonia in 21 cases and by myocarditis in three. Altogether, evidence of myocardial damage of a severe type was remarkably infrequent, either by electrocardiographic examination during life or by post-mortem investigation, and the author regards the condition as being of secondary importance. In his view mechanical and toxic damage to the vessels of the central nervous system plays a predominant part in the pathology

of the disease. There were three deaths from arterial thrombosis, two from empyema, and one each from septic oedema of the throat and myocarditis without severe cerebral symptoms.

Various forms of treatment are discussed, but the only drug that is referred to with special approval is strophanthin, which was given in large doses, daily during the febrile stage, and in smaller doses in convalescence when evidence of circulatory disturbance persists.

Sulphapyridine seemed to do harm rather than good, even in cases with pneumonia. *John W. D. Megaw.*

Aschenbrenner, R. & Marx, R. Zur Frage des "Nachfiebers" in der Fleckfieber-Rekonvaleszenz. [**The "After-Fever" in Convalescence from Typhus Fever.**] *Klin. Woch.* 1943, Feb. 20, v. 22, No. 8, 159–62, 3 figs. [11 refs.]

An unexplained rise of temperature was sometimes observed about the end of the first week of convalescence from typhus fever. This lasts only one to three days in most cases and is of importance only because it is likely to cause needless anxiety. The author suggests that it may be a late immunity reaction. [See also this *Bulletin*, 1942, v. 39, 542; 1944, v. 41, 556.] The paper contains a table showing the complications and sequelae observed in 691 cases, of which 106 were fatal. Apart from rarities these were :—Bronchitis (348), pneumonia (83), "after fever" (46), diarrhoea (35), otitis media (34), septic throat (34), furunculosis (21), abscesses (10), empyema (9), parotitis (6), venous thrombosis (6), arterial thrombosis (4), and skin necrosis (4). *John W. D. Megaw.*

Siedek, H., Kasperczik, K. & Fanta, H. Kreislaufstörungen in der Fleckfiebergenesungszeit. [**Circulatory Disturbances in Convalescence from Typhus Fever.**] *Klin. Woch.* 1943, Feb. 27, v. 22, No. 9, 179–82, 2 figs. [15 refs.]

This paper consists largely of a discussion of the relationship existing between the cardio-vascular and nervous disturbances occurring in typhus fever, especially in the convalescent stage.

Various disturbances of nervous origin are said to occur in 35 per cent. of convalescent patients, but cardio-vascular disorders are even more frequent and were observed in 45 per cent. of 500 patients studied by the authors. Tachycardia was common even in patients who were resting; cardiac pain and oppression were also prominent features in many cases. The pain was more uniformly associated with Head's zone in these cases than in angina pectoris. Numerous electrocardiograms were studied; these showed that lesions of the heart played a secondary part in causing the cardiac disturbances, which were regarded as being associated with damage to the vasomotor nerve centres and peripheral vessels. The systolic blood pressure in the radial artery was higher than 130 mm. in 31 per cent. of 360 patients in whom it was tested during convalescence. A curious feature was that although the radial systolic pressure showed the normal degree of increase on exertion, the cerebral pressure (estimated by observations made on the retinal arteries) remained almost the same. By the "tilt test" it was found that when the body was placed in the head-down position at an angle of 45 degrees the systolic pressure in the cerebral arteries was usually increased much more than in normal persons. These observations, and other evidence, were regarded as pointing to lesions of the carotid sinus or of the vasomotor nerve centres. The beneficial effect of "sympatol" was considered to be evidence in support of this view. *John W. D. Megaw.*

CIMMINO, V. Studio E. K. Grafico sul danno miocardico del dermotifo. [**Electrocardiography in Typhus.**] *Boll. Soc. Ital. di Med. e Igiene Trop.* (Sez. Eritrea). 1943, v. 2, No. 4, 23–43. English summary.

"Electrocardiography proves that during the course of typhus, myocardial lesions, more or less grave, are noted. Such lesions not only persist up to the 10th day of convalescence, but very often get worse."

ROBBERS, H. Das Elektrokardiogramm in der Flecktyphus-Rekonvaleszenz. [**The Electrocardiogram in Convalescence from Typhus.**] *Klin. Woch.* 1943, Mar. 20, v. 22, No. 12, 254–6. [12 refs.]

RAVEN, R. W. **The Surgical Complications of Typhus Fever.** *J. Roy. Army Med. Corps.* 1944, Sept., v. 83, No. 3, 119–22. [10 refs.]

This brief account of the surgical complications of typhus fever is based on "many conversations with surgeons and physicians practising in North Africa and a study of the relevant literature." It deals chiefly with the infective complications, most of which are caused by pyogenic organisms. DANIELOPOLU [this *Bulletin*, 1918, v. 11, 131] is quoted as stating that streptococci are the commonest organisms, and CONSTANTINE [*Algérie Med.*, 1941, 207] as attributing 60 per cent. of the complications to staphylococci and only 12·5 per cent. to streptococci.

The importance of early diagnosis and of resistance-building treatment is stressed; it might have been added that generous diet and good nursing will do much to reduce the incidence of these complications.

In a paper of three pages it is obviously impossible to give a complete account of the subject; for example the treatment of gangrene of the limbs is stated to consist in "amputation well above the line of demarcation" and no reference is made to the important matter of deciding when to amputate.

It is stated that there appears to be a racial resistance to the disease, and an unnamed authority is quoted as saying that "the Russians have a high resistance, the French moderate, and the Roumanians a low resistance, suppurative complications always occurring." [In view of the pronounced influence of age and environmental factors it is very doubtful whether inherited resistance plays any important part, except perhaps in weeding out persons with low resisting powers. In the Rumanian epidemic so graphically described by Danielopolu, environmental factors connected with war fully accounted for the low resisting powers of the people.] *John W. D. Megaw.*

HOFER v. LOBENSTEIN, M. Ueber die günstige Wirkung durch Uebertragung von Rekonvaleszentenblut beim Fleckfieber. [**Favourable Effect of Convalescent Blood in Typhus.**] *Münch. med. Woch.* 1943, Feb. 12, v. 90, No. 7, 119–20.

ANDERSON, C. R. **Survival of *Rickettsia prowazeki* in Different Diluents.** *J. Bacteriology.* 1944, June, v. 47, No. 6, 519–22.

Rickettsia prowazeki suspended in sterile skim milk was found to survive up to 48 hours; in all the other fluids that were tested the survival time was much shorter. In distilled water or saline the viability of the organisms was almost completely lost after six hours, and the addition of 1·0 per cent. glutathione made no difference. Broth with 20 per cent. normal yolk-sac fluid, and chick juice obtained in a cell-free condition from 8- to 10-day embryos, were favourable media, but not so good as skim milk.

The survival time was estimated by inoculating groups of four cotton rats by the intracardiac route with standard doses of the various suspensions, which were kept at laboratory temperature after preparation.

In another set of experiments suspensions of the livers of infected cotton rats were made in broth and then titrated at 0°C., in saline, broth, and skim milk, in ten-fold dilutions. Within an hour of preparation the various dilutions were injected intraperitoneally into cotton rats, and three weeks later the animals were tested for immunity.

Animals inoculated with dilutions made in skim milk or broth were found to have been protected by doses only 1–1,000 of those needed when the dilutions were made in saline.

Full details are given of the technique employed. *John W. D. Megaw.*

Berkowitz, A. P. **Notes on the Use of Duck and Turkey Eggs for the Large-Scale Preparation of Epidemic Typhus Vaccine.** *South African J. Med. Sci.* 1944, Aug., v. 9, No. 3, 109–10.

The author found that the yield of anti-typhus vaccine from each duck's egg was about five times greater than from a hen's egg. The great richness of the growth rendered processing of the vaccine much simpler.

Turkeys' eggs gave yields equal to those of ducks' eggs.

The conditions of incubation are described. *John W. D. Megaw.*

Horrenberger, R. & Renoux, G. Utilisation du mouton pour la préparation du vaccin antityphique (antirickettsien) non vivant d'après la méthode du Durand et Giroud. [**The Use of Sheep in the Preparation of Typhus Vaccine.**] *Arch. Inst. Pasteur d'Algérie.* 1943, Mar., v. 21, No. 1, 4.

The authors have obtained with sheep almost as good results as with rabbits in the multiplication of rickettsiae from which killed vaccine may be prepared. The animals are infected *via* the respiratory tract. The great advantage of sheep is that very large quantities of vaccine can be prepared, and that the animals can easily be got and maintained. *Charles Wilcocks.*

Durand, P., Beguet, M., Horrenberger, R. & Renoux, G. Recherche du pouvoir neutralisant du sérum des vaccinés contre le typhus exanthématique. [**The Neutralizing Power of the Serum of Persons Vaccinated against Typhus.**] *Arch. Inst. Pasteur d'Algérie.* 1943, Mar., v. 21, No. 1, 1–3.

Four groups of persons (in North Africa) were vaccinated with four vaccines of dead rickettsiae (formolized vaccine from mice and from rabbits [three doses] ; xanthate vaccine [three doses] and the same [two doses]). Three other groups were vaccinated with live vaccine (Blanc vaccine, one dose ; Laigret vaccine in two doses, or by scarification). Serum was taken before vaccination, and again three weeks after the last inoculation, and was mixed, undiluted, or diluted 1 : 2 or 1 : 4, with 1/4,000 suspensions of infected mouse lung ; the mixture was injected intradermally into a rabbit. Serum from 22 persons, taken before vaccination, neutralized the infective material, and serum from 141 failed to do so. After vaccination the serum from 90 of the latter neutralized the lung suspension, but whereas about 8/10 of those vaccinated with killed vaccines gave protective sera, only about 4/10 of those vaccinated with live vaccines did so. It seems, therefore, that killed vaccine is more effective than ive vaccine in this respect.

[It seems unlikely that this test gives a clear-cut decision as to the presence, or complete absence, of neutralizing power, and the fact that 22 sera neutralized the infective suspension before vaccination would lead to the suspicion that in some of the sera which failed to neutralize the infecting dose there might have

been at least some protective power, inadequate to the conditions of the actual test. If that is so the vaccination may have exercised a " recall " effect.]

Charles Wilcocks.

BRAUN, H. & UNAT, E. K. Erfahrungen ueber Antikörperbildung des Menschen nach intravenöser Injektion abgetöteter Fleckfieber-Proteus-Bazillen. [**Experiments in Antibody Formation in Man after Intravenous Injections of Killed Typhus-Proteus Bacilli** (*Proteus OX19*)]. *Istanbul Seririyati.* 1944, Feb., v. 26, No. 2, 21–38, 5 charts.

Agar-slope cultures of *Proteus OX19* of 24-hours' growth were suspended in saline, killed by heating at 56°C. for half an hour, and titrated to a strength of about 900 million organisms per cc. The Weil-Felix reactions were carried out with live cultures of *Proteus OX19* suspended in saline ; the titres recorded were the highest at which definite agglutination, however slight, could be detected after 24 hours, during the first two of which the tubes were kept at 37°C.

Altogether 25 persons received injections by various routes and with different doses ; the agglutination titres were observed at the time of injection and at intervals afterwards.

One person received an intravenous injection of about 450 million *OX19* ; this caused a sharp febrile reaction. [No mention is made of the reaction in the other cases.] The original titre for *OX19* was 1–20 ; after five days it rose to 1–160 ; and after 10 days it reached the highest point, 1–5,120. Four months later it was 1–320.

Another person received two intravenous injections of about 450 million each ; the interval between the injections was five days. A titre of 1–20,480 was reached nine days after the second injection, and about three and a-half months later the titre was 1–640. No negative phase could be detected after the second injection in this or any other person who received multiple injections.

Another person received three doses—450 ; 900 ; and 1,800 million—by the same route and at five-day intervals. Five days after the third injection the titre rose to 1–10,240 ; four months later the titre was 1–640.

A still higher titre was observed in a person who received a similar course of injections, the maximum being 1–20,480 ; and after four months the titre was still 1–1,280.

The same doses as were given in the two preceding cases were given by the intramuscular route to two persons ; each of these had a maximum titre of 1–160, just before the third injection was given, and within two months the titre had returned to normal.

The same doses by subcutaneous injection caused a rise of titre, to 1–320 in one person and to 1–1,280 in another. There was a rapid fall in the former case, normal being reached within a month ; in the latter the titre was 1–80 after two months.

The results of the other experiments are briefly summarized as follows :— Reduction of the intervals between the three intravenous injections made no material difference ; intervals of four, two and one days were tested. Reduction in the doses to one-tenth or even one-hundredth of those stated above made little difference in the resultant titres when the injections were given intravenously. For example, high titres were observed after three intravenous doses of 4·5 ; 4·5 ; and 9·0 million respectively ; but these doses given subcutaneously caused a rise to only 1–80 in one person, and no appreciable rise in another.

The authors refer with approval to the suggestion by FELIX [this *Bulletin*, 1943, v. 40, 232] that the thermostable *OX19* antigen may prove to be of value

in strengthening the immunity produced by rickettsial vaccines prepared from rickettsiae which cause diseases in which *OX19* agglutinins are developed. [Felix succeeded in obtaining Weil-Felix titres rising to between 1–20,000 and 1–60,000 in three out of four horses by inoculating them with the alkali-stable *O* antigen of *Proteus OX19*, and suggested that serum of this type combined with anti-rickettsial serum might be of special value in treatment. BARTH (this *Bulletin*, 1944, v. 41, 657) claims to have immunized guineapigs and human beings with vaccine made from a special strain of *Proteus X19*.]

The authors suggest that mixed vaccines, prepared from cultures of rickettsiae and *Proteus OX19*, and administered intravenously, may prove to be more effective, and much less costly, than rickettsial vaccines given subcutaneously.

[No comment is made in justification of the use of the name typhus-proteus bacilli.] *John W. D. Megaw.*

SOFIA, F. Ricerche sperimentali sul virus esantematico in Asmara. Nota I — virus murino. [**Experimental Research into the Virus of Typhus Fever in Asmara.**] *Boll. Soc. Ital. di Med. e Igiene Trop.* (Sez. Eritrea). 1944, v. 3, No. 1, 242–75. [18 refs.] English summary, pp. 264–5.

Murine rickettsiae were isolated from the brains of 7 out of 17 wild rats caught in different parts of Asmara. The positive rats gave negative or low-titre Weil-Felix reactions, only one of them reacted at a titre as high as 1–40; whereas in five of the ten rats from which rickettsiae could not be isolated the titres were 1–40 to 1–160.

The guineapigs originally inoculated had mild or irregular febrile reactions in most cases, and the scrotal reactions were often slight, but after two or three passages in which infected brain substance was used, the strains behaved in the manner typical of murine rickettsiae.

Murine rickettsiae were also isolated from the blood of two patients in Asmara. Of the four guineapigs inoculated with the blood of these patients three had moderate scrotal reactions, one had none. After passage through other guineapigs these strains also became typically murine in their character; they showed cross immunity with the strains of rat origin. *John W. D. Megaw.*

HAY, C. P. **Scrub Typhus at Port "X."** *J. Roy. Nav. Med. Serv.* 1944, July, v. 30, No. 3, 127–35, 2 figs.

This excellent paper is of special interest and importance at the present time. Its publication has probably been delayed for "security reasons," but the real interests of security demand that it should be read by everyone who is concerned with the health of the fighting forces in the vast area where mite-borne typhus is one of the great causes of wastage of man-power and therefore an urgent military problem.

On October 8th, 1941, a force of 1,059 Royal Marines landed on an unnamed coast and were engaged on the work of clearing undergrowth and palm trees. On October 18th one of the men went down with fever which was labelled "P.U.O." Other cases occurred almost daily, and by November 21st, when the Hospital Ship "Vita" arrived, there were 42 patients. These, and eight others admitted up to November 30th, are dealt with in the report. Further cases occurred later, but their records were incomplete at the time of writing.

The general description of the clinical features of the disease conforms in most respects with that of louse-borne typhus of moderate severity. Some of the chief features of the 50 cases were as follows. The onset was sudden in all; it was with rigor in 42 cases; the maximum temperature was reached by the fourth day; the fall was by lysis after a period of continued fever. The usual

duration of the fever was 11 to 19 days ; a few cases lasted longer, even up to 26 days in two instances. The pulse rate was relatively slow during the first week. In several patients the blood pressure fell to 100/60 by the 14th day. Evidence of cardiac weakness was common in the convalescent stage. The total leucocyte count was usually 9,000 to 12,000 per cmm. ; in two cases there was leucopenia.

A rash was observed in 17 out of 26 patients who were admitted early ; it appeared, on the fourth, fifth, or sixth day, as dull red macules on the sides of the chest, and soon spread over the trunk and limbs ; by the 12th day only brown staining persisted. No petechial haemorrhages were seen.

The face was flushed at the onset ; later it became bloated, and with swollen eyelids and reddened conjunctivae the patient had a drunken expression. Headache, chiefly retro-orbital, was early and intense in 45 patients. Backache and body pains occurred in 31 cases. Drowsiness and prostration occurred in all the patients. A special feature was the disappearance of the abdominal reflexes during the first week in every case. Coarse tremors of the limbs were present in convalescence in six patients ; depression at this stage was common. The spleen was palpable in four cases. Sore throat occurred, early in 15 cases, and later in five. Epigastric discomfort or pain occurred at an early stage in 26 cases. A dry cough was an almost universal feature during the second week ; in 25 cases it started early.

A local sore accompanied by lymphadenitis [which used to be regarded as of universal occurrence in mite typhus] was observed in only three patients. Convalescence was slow ; an average period of the two months' rest was needed after the end of the fever, and even then only light duty was permissible.

In 14 cases the end titres of the agglutination reactions were tested ; *Proteus OX19* was not agglutinated except for one reaction of 1–80. *Proteus OXK* titres ranged from 1–640 to 1–20,000, and in the whole series the maximum *OXK* titre was never less than 1–320 in any case. This reaction was the final diagnostic criterion. The rash often failed to appear even in white-skinned pa tients, and it is stated that in a group of nine Indians, admitted later for the disease, the rash was absent in all.

The treatment was on the lines suitable for louse-borne typhus. Lumbar puncture was carried out in six cases for the relief of severe headache, and was effective in five of these. Dehydration, resulting from difficulty in swallowing, was pronounced in three subjects : in two of these the Murphy drip was successful, in the third intravenous saline with glucose was needed. Sulphapyridine (5–6 gm. daily for five days) was given to 12 patients ; no benefit was observed, and some of the patients suffered from unpleasant effects. Convalescent serum, in doses of 15 cc. intravenously together with 14 cc. intramuscularly, was given during the first week to two patients, without obvious benefit.

Larval mites, conforming in appearance to *Trombicula deliensis*, were found on the dried leaves of palms and grasses in the affected area ; they were also found on rats of which the most numerous were *Rattus rattus frugivorus*, though *R. norvegicus* was also common. A family of *R. rattus frugivorus* was captured ; the adult rat's serum agglutinated *OXK* at a titre of 1–160 ; one of the four young rats reacted at 1–40, the others were negative. By a lapse on the part of someone the author is shown as stating that " the positive results show that *R. orientalis* disease does not exist among the rat population."

Seven local children, aged 7–12 years, were examined ; all gave positive reactions with *OXK* ; the titre was 1–160 in one, 1–80 in two, and 1–20 to 1–40 in the rest. The titres in five local adults were : 1–40 in four, and 1–20 in one. It seemed likely that all the local children must become infected at some time and that the adults have some degree of acquired immunity.

Of the 50 patients at "Port X" 28 had actually been engaged on scrub clearing and the rest had come into close contact with scrub conditions. The suggested measures of prevention are: clearing and burning all vegetation, including the palm trees, from camp sites and roadways by persons provided with mite-proof clothing; prohibiting entry to scrub land; rat-proofing of stores and galleys; and a vigorous anti-rat campaign. *John W. D. Megaw.*

ZAIR, A. H. **Scrub Typhus.** *J. Roy. Nav. Med. Serv.* 1944, July, v. 30, No. 3, 135–7.

This is a brief general description of scrub typhus; it is based, presumably, on cases seen at a Naval Hospital on an Indian-Ocean coast. Some statements in the paper need correction or qualification—for example, "the incubation period is about three weeks"; and the table of agglutination responses wrongly shows the same general type of reaction for tick typhus as for louse and flea typhus.

Among the methods of prevention that were used, one would be extremely valuable in any place where it could be adopted; this was the employment of bulldozers for scrub and jungle clearing. Where manual clearing is needed, it is advised that the scrub should be sprayed with kerosene and burned, as a preliminary measure. Mr. H. CARTER, Medical Entomologist for Ceylon, is quoted as advising caution in undertaking rat-control operations; trapping the rats alive and immersing them in kerosene was regarded as the only safe method. Mr. Carter also recommended the regular removal of coconuts from the palm trees, by indigenous labour, as the best way of reducing the rat population in the neighbourhood of camps.

The case-fatality rate in the area was low, but the morbidity and invaliding rates were high. *John W. D. Megaw.*

WEDD, S. **Lymphocytes Speckled and Plain: an Unrecorded Blood Change in Scrub Typhus.** *J. Roy. Nav. Med. Serv.* 1944, July, v. 30, No. 3, 137–44, 2 figs.

In a study of 400 blood films stained by Wright's or Leishman's method it was found that the average number of "speckled lymphocytes" was greatly increased in the post-febrile stages of scrub typhus. Control counts were made in normal persons (89 counts), patients with sepsis (18), malaria (38), pulmonary tuberculosis (13) and dengue (19). In these conditions the average counts were much lower, but in five cases of recent amoebic dysentery high counts were observed.

The speckled lymphocytes are those containing the "azurophilic granules" described by MICHAELIS and WOLFF in 1902; the granules are reddish in colour in smears stained by the above methods; in normal blood such speckled cells were found to constitute on the average 18·6 per cent. of the lymphocytes with a range of 5 to 37 per cent. Their actual numbers averaged 550 per cmm. with a range of 69 to 1,589. The figure of 1,200 was exceeded only three times in 89 counts and was taken as the upper normal limit. This limit was exceeded in all but three of the 22 patients who were examined within 40 days of the end of the fever stage of scrub typhus. The usual trend was towards a maximum count early in convalescence, and a gradual fall to normal, which was reached about 40 days after the end of the fever. In one exceptional case, the count was 224 on the 13th day of convalescence and 1,670 on the 19th. The average of 76 counts in convalescence was 1,228, and the extreme limits were 104 and 6,700.

In a footnote, it is stated that six patients were examined at another hospital on the 15th day of scrub typhus and that 41–69 per cent. of the lymphocytes

were speckled ; on the 25th day the percentages ranged from 20 to 50, with an average of 39 ; the actual numbers ranged from 650 to 4,725, with an average of 2,100. In these cases the total leucocyte counts are mentioned : they ranged from 10,800 to 24,200 per cmm.

The *OXK* agglutination titres of the patients during the febrile stages are not specified ; the highest titre recorded was 1 to 250—in three cases, on the 24th, 17th, and 40th days respectively after the onset of the fever.

In four out of five patients suffering from amoebic dysentery of recent development, the count of speckled lymphocytes at some time exceeded 1,200 per cmm., and the author suggests that high counts may occur in other diseases.

[If the condition is found to be of definite significance, the name " azurophilosis " will be more convenient than " increase in the speckled lymphocytes."] *John W. D. Megaw.*

War Office. Army Med. Dept. Bull. No. 41, 1944, Nov., 1–2. **Fluid Balance in Scrub Typhus.**

" According to recent information,* fluid retention may be well marked in severe cases of scrub typhus (tsutsugamushi disease). Therefore fluid intake and output need to be carefully balanced, or the patient may suffer from the treatment ; intravenous fluids are seldom required in scrub typhus, and their ill-advised use may have special dangers. In severe cases, it is not considered safe to force fluids by mouth beyond 4 or 5 pints daily.

" The cause of the fluid retention is still not clear, and further investigations are being made. Meantime it has been noted that a well-marked diuresis, indicating the end of fluid retention, also foreshadows the onset of clinical improvement. In a recent series, diuresis was noted in all of 11 severe cases and also in many milder infections. In the severe cases, the average daily fluid intake before diuresis was 98·8 ounces and the average output 39·7 ounces. On the first day of diuresis the average intake was 119·1 ounces and the average output 95·7 ounces.

" The diuresis in these severe cases is noted usually around the 14th day, and about 3 to 4 days later the temperature settles below 99 deg. F. Along with the diuresis there is usually subjective improvement even before the temperature falls, but the patient's appearance may show a deceptive worsening. The fluid that has hitherto been retained hides the evidence that a good deal of flesh has been lost ; and the loss of flesh masks the occurrence of any oedema. Thus it will be understood how both abnormalities may pass unobserved, and may indeed combine to give the patient a normal appearance.

" With the sudden diuresis, the oedema is removed and the full extent of the wasting is abruptly and dramatically disclosed. To all appearances the patient has taken a sudden turn for the worse ; he is profoundly weak, his temperature has not settled, and his flesh has suddenly seemed to melt away. Two observations may reassure the clinician—the presence of diuresis, and the patient's own feelings. The confused mental state usually clears with the onset of diuresis, and the patient himself is in no doubt that the change in his condition is decidedly for the better. A few days later this will be confirmed when the temperature returns to normal.

" We mention this phenomenon of fluid retention followed by diuresis in scrub typhus as a matter of interest that has not yet become part of the text book description. In general it is good advice to ' push fluids ' in all fevers and

* Extract from report from 2/2 Australian General Hospital for quarter ended 30/6/44. (Circulated as T. F. 37 by M. R. C. Typhus Committee.)

those who nurse patients with epidemic and endemic typhus are usually so advised. Evidently it is also important to check the daily intake and output of fluids.

" In severe cases of epidemic typhus there is often oliguria, and diuresis may be well marked at some stage in the convalescence ; but here the fluid retention is usually associated with a raised blood urea and the lowest levels of blood pressure.

" In scrub typhus the myocardium usually shows marked signs of weakness, but evidence so far available shows that diuresis is not accompanied by any significant rise of blood pressure, the blood urea is seldom high, casts and red cells are not often seen in the urine, and the kidneys of fatal cases do not often show obvious glomerular lesions. The underlying causes of the fluid retention and diuresis in scrub typhus may not be easily found, but it would be of great value to have further clinical details about their occurrence and relation to other events in all forms of typhus. So there is an open and interesting field for further careful observation of a kind that requires neither specialized knowledge nor equipment."

CAVAZZI, G. Segnalazione di cinque casi di febbre bottonosa sull'altopiano etiopico. [**Report on Five Cases of Boutonneuse Fever in the Ethiopian Highlands.**] *Boll. Soc. Ital. di Med. e Igiene Trop.* (Sez. Eritrea). 1943, v. 2, No. 2, 5–9. [11 refs.] English summary (4 lines).

These five cases occurred in Eritrea and Asmara ; in all of them a black scab (tache noire) was observed at the site of the tick bite. The fever lasted 12 to 15 days, and was relatively severe, though none of the patients died. The onset was gradual and the termination was by rapid lysis. The rash appeared first on the trunk, it spread rapidly to the rest of the body, including the face, palms, and soles, it was definitely papular, and in two of the patients petechiae were seen. There was albuminuria, with granular casts, leucocytes, and a few red blood cells, in the urinary sediment.

The Weil-Felix reaction was negative throughout the illness in one patient ; in the others the maximum titres were, 1–80, 1–160, 1–160, and 1–640. In the one case in which a biological test was made there was no cross immunity with historic typhus.

The disease was regarded as being the same as Mediterranean boutonneuse fever ; but the exact relationship to that disease and to tick-bite fever remains to be worked out. *John W. D. Megaw.*

HELD, A. " Rheumatische " Knötchen beim Wolhynienfieber. [**" Rheumatic " Nodules in Trench Fever.**] *Münch. med. Woch.* 1944, Apr. 21, v. 91, No. 15/16, 193–4.

The author states that in trench fever nodular or cord-like bodies are often found by careful examination of the scalp and other parts of the skin of the head, also in other parts of the body to a lesser extent. These are tender to the touch and are believed to form the physical basis of the headaches, shin-bone pains, etc., which are conspicuous features of the disease. When the nodules are effectively treated by massage, preceded by warm applications, the headaches and other pains disappear.

Acting on the view that the nodules indicate an allergic reaction, the author tried non-specific protein therapy and obtained satisfactory results. This treatment was not given in the acute stages of the disease, but in the chronic forms it was found that slight rises in temperature were not contra-indications ;

in fact the recurring attacks of fever were often cut short. In the early stages large doses of pyramidon (amidopyrine) were of considerable benefit.

John W. D. Megaw.

YELLOW FEVER.

BOSHELL-MANRIQUE, J. & OSORNO-MESA, E. **Observations on the Epidemiology of Jungle Yellow Fever in Santander and Boyacã, Colombia, September, 1941, to April, 1942.** *Amer. J. Hyg.* 1944, Sept., v. 40, No. 2, 170–81, 3 maps.

The authors have collected large numbers of mosquitoes in the Colombian mountain districts of San Vicente de Chucurí (Santander del Sur) and Muzo (Boyacá), and tested their infectivity by feeding them on *rhesus* monkeys, and also by inoculating the ground-up contents of the mosquitoes into the brains of mice.

Yellow fever virus was demonstrated in two batches of *Haemagogus capricorni* Lutz, caught in Cuincha, and also in two batches from San Isidro, districts south of Muzo. In one instance, a monkey bitten by these mosquitoes became immunized, although mouse inoculation failed to demonstrate the virus.

A batch containing two *Aëdes leucocelaenus* and six *A. dominicii* produced infection, which is considered to be probably due to the former species, a proved carrier. Possible transmitters were *Haemagogus equinus* Theobald and *H. lucifer* Howard, Dyar and Knab.

A few marsupials were caught, including *Didelphys, Metachirus, Caluromys* and *Chironectes*. Two protective sera were found out of 14 examined, but the animals could not be kept alive for confirmatory tests.

The authors found that *Haemagogus* travels considerable distances from its breeding places; also virus-carrying mosquitoes were caught in localities remote from the probable sources of human infection. This species is strongly phototropic and in mountain districts during the afternoon travels up the slopes away from the deeper parts of valleys which are in the shade. There is also a tendency for *Haemagogus*, when seeking blood, to follow human beings and mules some distance from the forest.

It is emphasized that the yellow fever virus isolated in these experiments was of purely jungle origin, and the infected mosquitoes were caught in uninhabited and virgin jungle, distant from any contact with man. *E. Hindle.*

PERLOWAGORA, Alina & LENNETTE, E. H. **Observations on the possible Usefulness of the Complement-Fixation Test in the Early Diagnosis of Yellow Fever.** *Amer. J. Trop. Med.* 1944, July, v. 24, No. 4, 235–44. [11 refs.]

The authors previously described a complement fixation test for the diagnosis of yellow fever in man and animals (see this *Bulletin*, 1944, v. 41, 211) and in the present paper give the results of its application in 18 monkeys, *Macaca mulatta*, and 31 marmosets, *Callithrix jacchus*, infected either with the Asibi strain of yellow fever virus or with one of the South American jungle strains. In this test the antigen is present in the serum of infected animals, the antibody in the serum of animals recently recovered from the infection.

In a preliminary experiment complement-fixing antigen was found without exception in the sera of 6 monkeys and 17 marmosets infected with yellow fever virus, the blood being collected at, or just prior to, death. Subsequently 12 monkeys and 14 marmosets were inoculated with various strains of virus and the serum examined daily in the case of the monkeys, and at various intervals in

the case of the marmosets. The results are given in tabular form and indicate that occasionally the antigen might appear in the blood on the second day after inoculation, especially in marmosets. As far as can be judged the time of appearance in the blood was roughly dependent on the length of the interval between inoculation and death of the animal; when this period was three to five days the antigen usually appeared on the third day and when longer the antigen appeared one to three days later. In four monkeys and one marmoset which survived infection, antigen was not found in any of the serum tested.

There was no obvious correlation between the febrile reaction and appearance of antigen, also the presence of relatively large amounts of circulating yellow fever virus in three monkeys and a marmoset which survived, was not accompanied by the development of antigen. This would seem to indicate that this property is associated with a factor distinct from the virus. In 10 out of 37 animals a post-mortem diagnosis of yellow fever virus infection could not be made by histological examination of the liver, although it was made during life by examination of the serum for complement-fixing antigen From these results it may be possible to use this test for the diagnosis of the disease in human cases of yellow fever. *E. Hindle.*

SELLARDS, A. W. & MCCANN, W. S. **Choline Hydrochloride in Experimental Yellow Fever in Rhesus Monkeys.** *U.S. Nav. Med. Bull.* 1944, Sept., v. 43, No. 3, 420–22.

The authors tested the effects of choline hydrochloride by mouth on the course of the infection in rhesus monkeys, *Macaca mulatta*, inoculated with the Dakar strain of yellow fever virus, which for 15 years had exhibited uniformly lethal properties.

TABLE I.—*Summary of results.*

Lot 1—Choline started about 2 hours prior to injection of virus.

Rhesus	Choline		No. of days of continuous fever	Result
	Mgm. per kilo	No. of days		
462	80	13	6	Recovery
463	80	12	none	Recovery
461	160	12	none	Recovery
465	160	4	2	DD—4th day
464	control		2	DD—3rd day
466	control		3	DD—4th day

Lot 2.—Choline started 3 days prior to injection of virus.

Rhesus	Choline		No. of days of continuous fever	Result
	Mgm. per kilo	No. of days		
467	80	3*	1	DD—4th day
468	80	4*	none	Recovery
469	160	6*†	3	Recovery
470	160	4*	2	DD—4th day
471	control		2	DD—4th day
472	control		3	DD—6th day

* Exclusive of 3 preliminary injections.

† Continued for 6 additional days on 80 mgm. per kilo.

In the first experiment six monkeys were inoculated with yellow fever virus and four were treated with the choline hydrochloride administered by means of a stomach tube. The drug was given two hours before the inoculation of virus and repeated daily, up to 13 days in the case of the survivors. Two monkeys received 80 mgm. per kilo. daily, and both survived, and two received 160 mgm. per kilo. daily and one survived. Both controls and the other treated monkey died on the 3rd or 4th day. In a second experiment with six monkeys, four being treated and two kept as controls, treatment in the same manner was begun three days before the injection of virus and two of the four treated monkeys survived. The experiments are summarized in the table above.

Thus out of eight monkeys receiving choline hydrochloride, three died and five survived. Even in the case of these three dead monkeys examination of the liver showed some evidence of a reparative process, with much less disorganization of the architecture and more proliferation in the periportal spaces.

[The death of Dr. Sellards interrupted the continuation of these experiments, which indicate the possibility that the liver may be protected against the action of yellow fever virus by the oral administration of choline.] *E. Hindle.*

War Office. Army Med. Dept. Bull. No. 41. 1944, Nov., 2–3. **Control of Yellow Fever.**

"Control of yellow fever was always a problem of preventive medicine of world wide importance; various war conditions, especially the passage of numerous aircraft through endemic zones, have added to the difficulties of control and increased its necessity. The disease, transmitted by the bite of *Aëdes aegypti* and related mosquitoes, was a serious danger to early colonists in West Africa. In 1826, out of a garrison of 535 soldiers, 115 died in two months, and of the first detachment of troops to occupy Cape Coast Castle (West Africa) in 1823, only one was alive in the following year.* In the Anglo-Egyptian Sudan in 1940–41 an epidemic caused at least 20,000 cases with 2,000 deaths.

"Many investigators gave their lives in a long series of devoted researches before it was finally established in 1928 that the disease was due to a filterable virus. In following years a safe and effective vaccine was developed that conferred good immunity by one inoculation with living virus modified by passage through animals and developing eggs. Systematic use of this vaccine is to-day one of the chief means of controlling the disease. A brief general outline of this aspect may be of value.

"Yellow fever is endemic in West Africa and certain parts of South America, especially Brazil. Certain other territories appear to offer all the necessary conditions for spread of the disease, but have, so far, remained free; these areas include Egypt and India. Whatever the reasons for their freedom, it is our object to avoid all possible risks of introducing the disease to these countries from the endemic zones.

"In days when travel was slow, the risk of spreading the disease beyond the endemic areas was not great. But to-day an aircraft can carry living infected mosquitoes, or passengers incubating the disease, in a matter of hours from a yellow fever area to a distant one, and the risk of spreading the disease is, therefore, real. When air traffic was on a small scale it could be regulated and directed from specially constructed (anti-amaryl) aerodromes with facilities for controlling mosquito breeding, screening huts, disinsectizing aircraft, and putting passengers in quarantine if there was a risk of their having been exposed to infection. These measures are still important, but increased air traffic and great extensions to aerodromes have made it difficult to apply these measures of control as effectively as before.

* *Manson's Tropical Diseases.* 1940. London. 11th Edition, page 354.

" But the vaccine has changed the whole problem. If all passengers are immune they can neither suffer from the disease nor transmit it. If all who live or work on or near the aerodrome are also immunized, the mosquitoes that bite them cannot become infected. After vaccination, immunity takes 7 to 10 days to develop fully and it lasts for 4 years. Therefore intending passengers must be immunized not less than 10 days or more than 4 years before they are allowed to proceed by air from an endemic to a safe area where the disease might develop. This means immunization of all air passengers who will pass through endemic zones of yellow fever.

" No biological method of control can ensure complete safety, but the sum of all the measures enormously weights the balance against transmission of the virus to new territories. Manufacture, storage, and handling of the vaccine requires an appreciation of certain technical facts concerning its properties ; therefore yellow fever immunization is done only at a limited number of special centres where suitably trained staff are available. The use of vaccine that was not fully potent would confer a false sense of security and might precipitate a disaster of international significance."

WILLIAMS, C. L. **Yellow Fever Control during the War.** *Amer. J. Trop. Med.* 1944, July, v. 24, No. 4, 245–7.

The potential danger of introduction of yellow fever into the southern United States has been increased by international air travel and especially by the dislocations and confusions of war. The author outlines the quarantine and control measures that have been introduced by the U.S. Public Health Service to meet war conditions. These follow the usual lines, but in connexion with control it is mentioned that a stock of one half million or more doses of yellow fever vaccine is maintained at its laboratories in Hamilton, Montana. This vaccine could be sent at short notice by airplane to any locality where it was considered necessary to institute general vaccination. The Public Health vaccine does not contain human serum and therefore its use has not been attended by any outbreaks of jaundice. *E. Hindle.*

DENGUE AND SANDFLY FEVER.

COLLINS, J. D. **Colorado Tick Fever. Report of Thirty-Nine Cases.** *Bull. U.S. Army Med. Dept.* 1944, Sept., No. 80, 81–5, 3 figs.

All the 39 patients whose cases are dealt with in this paper had bivouacked for several days before the onset of the fever in a tick-infested region near Colorado Springs. All the ticks found on the patients were *Dermacentor andersoni*. There was a definite history of tick bite in 27 of the cases, and in five others ticks had been found on the body or clothing. The average time between tick bite and onset was 4·7 days.

The average duration of the first spell of fever was 1·2 days, of the afebrile interval, 2·0 days, and of the second spell of fever, 1·7 days. A faint macular rash was seen in one patient.

The chief symptoms were :—fever, in all ; chills, in 36 ; headache, in 30 ; muscle aches, in 25 ; weakness, in 20 ; and cough, in 14. The leucocyte count was less than 2,000 in 2, and 2,000–4,000 in 25. In the 5 cases with counts of more than 6,000 the blood was examined late in the second spell of fever or in convalescence. In only one case there was a single spell of fever. There was no evidence of person-to-person transmission in any of the cases.

The disease is stated to differ clinically from dengue in the less severe involvement of the bones and joints and the absence of rash. No other difference could be detected. [See also this *Bulletin*, 1941, v. 38, 694.] *John W. D. Megaw.*

FLORIO, L., STEWART, Mabel O. & MUGRAGE, E. R. **The Experimental Transmission of Colorado Tick Fever.** *J. Exper. Med.* 1944, Sept. 1, v. 80, No. 3, 165–88, 6 text figs. & 2 figs. on 1 pl.

Colorado tick fever was recognized as a special disease by BECKER in 1930. The name is regarded by the authors as misleading because the disease is known to occur " in the same western area as Rocky Mountain spotted fever." The fever has been studied by TOPPING and his colleagues [see this *Bulletin*, 1941, v. 38, 694]. It closely resembles dengue fever except for the absence of rash, but dengue is unknown in the region of its endemicity, " unless indeed we are dealing with a tick-borne variety of this disease." There is very strong, though purely circumstantial, evidence that the transmitting vector is *Dermacentor andersoni*.

In the present investigation each of 5 volunteers received a subcutaneous injection of 4 cc. of serum taken from a patient during the first or second spell of fever. Four of the volunteers developed typical attacks after incubation periods of three or four days. Serum from the volunteers was used in the same way to initiate the inoculation of eight other persons, all of whom developed similar attacks, though in two cases the incubation period was five days, and in one it was 10 days. In the course of the experiments the infection was passaged six times in succession from person to person without obvious change in its characters of virulence.

Three of the patients were tested for immunity 9–11 months later ; two of them developed severe headache without fever four days after the test inoculation, the other had no symptoms.

Four of the persons who were inoculated had previously been immunized against Rocky Mountain spotted fever by double the usual number of injections of tick vaccine ; three of them developed typical attacks of Colorado tick fever, and the fourth, who came from a region of high endemicity, had slight fever and headache lasting three hours.

Unsuccessful attempts were made to transmit infection to five volunteers by the bites of the offspring of 12 laboratory-bred ticks (*D. andersoni*), which had fed on two of the experimentally-infected patients for 8–11 days, beginning from the onset of the fever. Two of these volunteers were tested later and were found to be completely susceptible to inoculation with infective serum.

Serum from an experimentally infected patient was used to initiate a series of transfers through golden hamsters (*Cricetus auratus*). The only obvious sign of the disease in these animals was leucopenia ; the leucocyte count of the animals fell by the 3rd or 4th day after inoculation from an average of 8,090 to one of 4,540. Serum from a hamster at the 7th passage was injected into a volunteer, who developed a typical attack of greater severity than any of the others that were observed.

Now that hamsters have been found suitable for the passage of the infection further work is contemplated with the object of determining whether the disease is related to dengue fever.

The blood changes observed in the experimental cases were found to be remarkably similar to those of dengue fever as described by SIMMONS and his colleagues in 1931 [this *Bulletin*, 1931, v. 28, 613]. The total leucocyte count fell to about 2,000 at the onset of the second spell of fever, and the Schilling haemogram showed a pronounced deviation to the left ; sometimes the band-forms were more numerous than the segmented. In early convalescence a few

peculiar large lymphocytes were often seen ; these had 2–8 small round bodies, staining like nuclei, in the cytoplasm.

[Colorado tick fever may turn out to have more than local importance. As the authors rightly suggest, the name is misleading and for this reason cases have been missed in other parts of the world, just as happened in connexion with Rocky Mountain spotted fever, whose name is even more unsuitable. The close clinical resemblance to dengue fever is a very striking feature of the disease, and the present experiments tend to support the tentative suggestion, already made by the reviewer, that it may be a tick-borne fever of the dengue group. If so, its relationship to mosquito-borne dengue would be somewhat analagous to that existing between tick-borne and louse-borne typhus.

Attempts will doubtless be made to transmit the virus of dengue and sandfly fever through the hamster, and it is to be hoped that these will be made with animals that have not been exposed to the risk of naturally-acquired infection and in localities which are known to be free from these diseases.]

John W. D. Megaw.

Stewart, Mabel O., Florio, L. & Mugrage, E. R. **Hematological Findings in the Golden Hamster** (*Cricetus auratus*). *J. Exper. Med.* 1944, Sept. 1, v. 80, No. 3, 189–96.

Philip, C. B., Paul, J. R. & Sabin, A. B. **Dimethyl Phthalate as a Repellent in Control of Phlebotomus (Pappataci or Sandfly) Fever.** *War Medicine.* Chicago. 1944, July, v. 6, No. 1, 27–33, 6 figs. [Refs. in footnotes.]

Dimethyl phthalate is the most widely used repellent at the present time, against mosquitoes and other blood-sucking insects. That its use will have some effect in reducing the incidence of malaria is inferred from the fact that it will prevent the biting of mosquitoes for several hours. The authors have succeeded in obtaining more direct evidence of its efficacy in controlling sandfly fever. In a barracks containing some 170 American soldiers on the outskirts of Cairo the use of this repellent was the sole preventive measure employed during a period of five weeks in the epidemic season. Bottles of dimethyl phthalate and of distilled water with or without a few drops of methylthionine chloride, were supplied to men occupying alternate beds. Five cc. of repellent was used per man per day, this amount being spread as a thin film, just before the man retired, on forehead, sides of face, neck, hands and forearms and any other exposed surfaces. Of the men receiving the repellent, 42 per cent. reported relief from bites ; of those receiving the control solution, 12 per cent. reported relief. Of the men receiving the repellent, two acquired sandfly fever, but both admitted that they had failed to apply it for several consecutive nights prior to contracting the disease. Of those receiving the control solution or no solution, 12 acquired sandfly fever.

V. B. Wigglesworth.

CHOLERA.

Yacob, M. **Epidemiology of Cholera in the Punjab.** *Indian Med. Gaz.* 1944, Aug., v. 79, No. 8, 383–90, 2 charts & 2 maps. [11 refs.]

In this interesting review of the epidemiology of cholera the author insists that the province of the Punjab is a non-endemic cholera area. It is, like Europe, the Netherlands Indies and Japan, a sufferer from the menace of its eastern or western neighbours. Perhaps we might not agree that British India

is so entirely and centrally black as it is painted in Map 1 of this article and contend that China or even the Russian Don region have some blame for the endemicity and potential epidemicity of cholera. The main reasons adduced for the continuance of cholera are the habits of the people, the prevalence of massed pilgrimage, and probably also a climatic environmental factor. It may not be too much to hope that these are all capable of being altered, regulated or countered by appropriate measures. The cases of Japan and Java, with more autocratic rule or more docile populations, might be cited in this connexion. The Western Punjab is not entirely free from the danger due to a great concourse of pilgrims, such as that " associated with the solar eclipse at Kurukshetra " in the Karnal district and " it is significant to remark . . .that the most recent solar eclipse fair at Thanesar held in 1941 passed off without a single case of cholera. The fair was attended by approximately 500,000 pilgrims." This would appear to have been a triumph for the Punjab health organization. When, however, he deals with the pilgrim centres of Hardwar, Benares and Allahabad, the author seems to align himself with the contention " that nothing less than protection by inoculation of the pilgrims going to and from the fairs can possibly stop the regularly occurring epidemics." A point on which he briefly touches and which is extremely important from the point of view of insistence on, and enforcement of, quarantine is the identification of the true epidemic cholera vibrio. Apart from the epidemic proof itself, this has been largely narrowed down to the possession of a heat-stable antigen, specific agglutinability and certain biochemical sugar reactions. Two useful maps, two equally useful charts and a table give a rapid review of the distribution and mortality of cholera according to province and seasons of the year.

W. F. Harvey.

Tang, F. F., Chu, C. M. & Wong, Y. W. **A Study of *Vibrio cholerae* isolated from the 1942 Kunming Epidemic, with special reference to Serological Types.** *Indian J. Med. Res.* 1944, May, v. 32, No. 1, 1–8.

For several months during the epidemic only the Inaba type of vibrio was found, but towards the end some Ogawa vibrios were encountered. Altogether 69 strains of isolated vibrio were typed and gave percentage proportions of 93 Inaba and 7 Ogawa. Two strains were inagglutinable but no " intermediate " strains were met with.

W. F. Harvey.

Misra, K. N. **Treatment of Cholera and Diarrhoea. Observations on 210 Cases.** *J. Indian Med. Ass.* 1944, July, v. 13, No. 10, 279, 282.

All of these 210 patients came to hospital with the diagnosis of cholera, and the bacteriological examination of the stools showed 153 to be cholera positive and 35 negative. The stools in the remaining 22 could not be examined. For purposes of analysis the cholera negative and the non-examined were regarded as cases of severe diarrhoea only. Treatment was carried out on a comparison basis, and this was :– (*a*) with $\frac{1}{6}$ grain calomel and 5 grains sod. bicarb. every half hour with the addition of alkaline saline, hypertonic saline and normal saline plus 5 per cent. glucose as circumstances demanded ; (*b*) with " cholera-phage " and sod. bicarb. drink (1 dr. to a pint) ; (*c*) with sulphapyridine, 3 gm. every 3 hours for 24 hours then 2 gm. [3-hourly ?] up to a total of 9 gm. ; and alkaline mixture ; (*d*) with sulphaguanidine tablets in the doses of 10 tablets of 0·5 gm. on admission, continuance at the rate of 4 tablets " every six hours till the stools per day became 5 or less and then 2 tablets every 8 hours till cure." The conclusions come to are :—Group D gave the best results, with only 1 death out of 16 cases treated. " In ' mild ' (early) cases, treatment with fractional doses of calomel or ' Phage ' solution gave a very good percentage or

cure," but was not reliable for severe (late) cases. Group C showed no better results than the other three and was more expensive than either Group A of Group B treatment. *W. F. Harvey.*

Bose, B. C. & Ahuja, H. L. **Detection of Pyrogens in Fluids by Biological Methods.** *Indian J. Med. Res.* 1944, May, v. 32, No. 1, 9–14, 2 graphs.

Solutions for intravenous injection should be free of pyrogenic organisms. Tests for freedom are : (1) the hyperpyrexia test and (2) the leucopenia test. Among the most useful findings in this paper are the precautions necessary to prevent physiological variation of body temperature and the range of that variation. When precautions are taken for the reading of temperatures, such as (1) the use of rabbits accustomed to handling ; (2) the use of fasting animals ; and (3) the insertion of the thermometer to a constant level of $\frac{3}{4}$ inch from the anal ring, the day-to-day variation does not exceed 0·6°F. Two organisms, one chromogenic and the other non-chromogenic, were isolated from reservoir water and were found to be notably pyrogenic. These were used to test the validity of the ordinary tests of pyrogenicity. As a result the hyperpyrexia test has been found fairly satisfactory, and the leucopenia test unsuitable.

W. F. Harvey.

BACILLARY DYSENTERY.

Bloom, H. **Dysentery in British Prisoners of War.** *Lancet.* 1944, Oct. 28, 558–60.

This is a somewhat tragic account of sufferings undergone by British prisoners of war in Italian prison camps in North Africa. From October 1942 to April 1943, the author was in medical charge of British prisoners in an Italian hospital. All had been captured in the second fortnight of June 1942, during the retreat from Tobruk. Herded in " cages " in various parts of Libya and Tripolitania they had no shelter and existed in semi-tropical heat. The diet was subminimal and consisted mainly of a handful of macaroni, 6 oz. of coarse brown bread, a small piece of cheese daily, with about an ounce of meat twice weekly. No attempts were made to provide proper sanitation, a few unprotected trenches in the camps were soon filled and overflowed. Flies abounded, and in some camps 90 per cent. of the men developed dysentery, many becoming so weak from starvation and incontinence that they were found lying beside the overflowing " latrines." In one camp during July 1942, 19 out of 3,000 men died ; in another, during the three months July to September, 100 died. " This mortality, beginning within a month of the capture of men who were fighting fit, gives one some idea of the appalling conditions in North Africa. Some of the worst cases were taken over to Italy in batches in October and November, under dreadful conditions and in all kinds of ships ; most of them were desperately ill and emaciated. In Caserta Hospital the deaths from " dysentery," apart from wounds, were 36 in October, 45 in November, 42 in December, 1942, 10 in January, 1943, 4 in February, and 2 in March and April.

In all, about 250 men were treated by the author, who was himself a prisoner, and eventually he was given a free hand (with the result that the frequent Italian diagnosis of " nephritis " for anasurca due to protein-deficiency was discarded). Sisters of Mercy and Red Cross nurses obtained everything possible in a country depleted of necessities by the occupying Germans. The only facility for investigation, apart from clinical study, was a laboratory under the

charge of an expert pathologist, to which the author was not allowed access, and which examined only faeces. All the men were extremely weak and emaciated ; many were unable to walk, and all were infested with lice, to which they were remarkably insensitive. With sunken eyes surrounded by waxy periorbital tissues, and with symptoms of severe dysentery (with the passage of 20 or more daily motions, often accompanied by incontinence), they presented a pathetic picture. Deficiency states were manifested as oedema of varying severity, atrophy and pigmentation of the skin, and loss of deep reflexes. Other symptoms of vitamin deficiencies appeared during the next three months.

Vitamin-A deficiency.—The high incidence of intercurrent infections suggested lack of vitamin A. These infections included a ten-day periodic fever, suggestive of trench fever, and cases of epidemic hepatitis. Six cases of night-blindness were identified, and there were probably more.

Vitamin-B complex deficiency.—Symptoms of beriberi were present in all except Indians and South African natives. These consisted of pains and tenderness in the limbs, muscular atrophy (contractures in one) and loss of peripheral reflexes. Cardiac involvement was apparent in 8 : acute neuritis involving pelvic visceral and somatic nerves in 3. Many of the men showed some or all the signs of ariboflavinosis—such as seborrhoeic dermatitis, vascularization of the cornea and unequal pupils (in 2). Pellagrous symptoms consisted of pigmentation and atrophy of the skin of shins and wrists. Many of the men showed symptoms of progressive melancholia.

Vitamin-C deficiency.—Some of the worst cases had haemorrhage from the intestine and kidneys, and petechial haemorrhages in the skin over various parts of the body, even when the consumption of lemons and oranges was high.

Vitamin-D deficiency.—Only those most seriously ill showed deficiency of vitamin D. The teeth of several turned black. In one case, six attacks of tetany with carpopedal spasm preceded death. Two men showed a strongly positive Chvostek's sign.

In none of the men was the onset of dysentery associated with fever. In a few it commenced with blood in the faeces, but in others the appearance of blood was delayed and persisted for months, with mucus and pus. Although *Entamoeba histolytica* was reported in all cases, emetine injections exerted no influence in the clinical sense. The major part of the infection appeared to be non-specific, and remained unresponsive to specific treatment.

For many months after the onset of their illness these men continued to receive the Italian ration of rice, cheese, milk and coarse wholemeal bread, meat was being withheld. It soon became obvious that the essential factor in treatment was the diet. Brown bread was therefore entirely replaced by porridge and other foods from Red Cross parcels and the improvement in patients on this diet, as compared with the bread-eaters, became obvious. Eventually, 8 oz. of meat were added daily, and not only did the bowel symptoms improve, but symptoms of vitamin-B deficiency gradually disappeared, with the lifting of the mental depression. Milk in large quantities was found to pass through the damaged bowel in large undigested masses.

Vitamin food deficiencies had to be made up from the diet and from Red Cross parcels. Local treatment by colonic washouts had no apparent effect.

Sulphaguanidine, which became available in February 1943, was given to 9 of the worst cases, with undoubted effect on 7 after an intensive course. Intravenous glucose and saline, by long-continued drip, never succeeded, probably because of the toxic condition of the heart, but intramuscular injections of 250.cc. of glucose saline twice daily were well tolerated and gave good results. The author was soon convinced that indiscriminate dispensing of " salts " to cases of dysentery is a most dangerous practice, and caused inevitable exacerbation of diarrhoea. [Those who remember somewhat similar, but not

such barbarously extreme, occurrences in the last war will recognize the clinical condition as the aftermath of bacillary dysentery in exhausted and partially starved men. At that time, we were ignorant of the syndromes caused by the vitamin-deficiencies, but, by analogy, it seems extremely doubtful whether the laboratory reports of the invariable presence of *E. histolytica* were correct. The acknowledged specific action of sulphaguanidine would suggest that the original infection was bacillary and not amoebic in origin.]

P. Manson-Bahr.

Howat, H. T. **Fatty Diarrhoea in Chronic and Relapsing Dysentery.** *Lancet.* 1944, Oct. 28, 560–61.

In the Middle East chronic and relapsing dysenteries of varied aetiology have been complicated by stomatitis and steatorrhoea.

The earlier cases were seen in prisoners of war and others who gave a history, in addition to inadequately treated dysentery, of inadequate dietary. Later a similar syndrome occurred in British soldiers whose diet had been balanced and well-controlled. At one period in 1943, six such cases were under treatment in one fifty-bed dysentery ward. During the acute phase stomatitis and sore tongue attributed to nicotinic acid deficiency were common, and rapid relief followed the giving of this drug in large doses by mouth. In British soldiers, riboflavin deficiency was not seen, nor were oedema or skin haemorrhages. Achlorhydria or hypochlorhydria was the rule. A mild hypochromia was usual, but megalocytic anaemia was noted in only one long-standing case of this group. The stools were increased in number, bulk and weight, offensive, frothy and greasy of the sprue type with excess of hydrolysed fat.

Hydrochloric acid and nicotinic acid in large doses by the mouth produced no alteration in the stools. In a few cases to which it was given in adequate dosage, parenteral liver extract caused amelioration of the acute features, but relapse ensued when it was discontinued too soon. Clinically, in sprue as in fatty diarrhoea associated with colonic disease, evidence of deficiency in various factors of the vitamin B_2 group is sometimes observed, but in many cases multiple factors are involved, which are difficult to dissociate on clinical grounds. The factors in the B_2 complex are interdependent, and deficiency of one may lead to imperfect action of others. A clue to the rôle played by chronic diarrhoea may be found in the cases in which the diet had been adequate throughout. These patients had been treated with sulphaguanidine, and in some, the relationship of the onset of fatty diarrhoea to this treatment was striking.

It is suggested that this drug may be a factor in the production of a conditioned deficiency, by inhibiting the growth of commensal organisms in the bowel; it has been shown experimentally that sulphaguanidine, and also succinyl sulphathiazole, over long periods can reduce the bacterial flora of the bowel, thus inhibiting synthesis of many essential factors—such as thiamin, members of the B_2 complex—pantothenic acid, folic acid and biotin—riboflavin, nicotinic acid, inositol, and vitamin K. Possibly the host relies on this synthesis for augmentation of the natural supplies of these vitamins.

It is suggested that the large-scale use of sulphaguanidine in the treatment of bacillary dysentery may explain the apparent rise in incidence of fatty diarrhoea in British soldiers with this disease. In one case, the onset of frank pellagra was precipitated by an exacerbation of Flexner dysentery.

[It would be better before accepting this hypothesis *in toto* to compare the incidence of steatorrhoea in a group of post dysenterics untreated by sulphaguanidine. The reviewer has for many years recorded the supervention of the sprue syndrome in patients convalescent from bacillary dysentery.]

P. Manson-Bahr.

Ferriman, D. G. & Mackenzie, G. K. **Comparison of Sulphonamides in Bacillary Dysentery.** *Lancet.* 1944, Nov. 25, 687–8.

The authors compared the effects of giving sulphanilamide, sulphaguanidine and sulphathiazole respectively in bacillary dysentery in a R.A.F. hospital in West Africa. There were 56 cases and in 27 of them dysentery bacilli (unspecified) were isolated. The measure of efficiency of the drug used was the time taken for the stools to return to normal; in cases which responded rapidly, constipation for 24 hours was often the first intimation of recovery, and this period was taken as half a day in the reckoning (see below). The dosage was: sulphaguanidine, initial dose 6 gm., then 3 gm. four hourly; sulphathiazole and sulphanilamide, initial dose 2 gm. then 1 gm. four hourly; when the stools became normal the treatment was given six hourly for 6 days or more. The results may be tabulated as follows:—

	Sulphanilamide	Sulphaguanidine	Sulphathiazole
Average time to recovery, days	3·6 (18 cases)	3·4 (18 cases)	2·7 (20 cases)
Cases taking longer than 3 days to recovery ...	3½–5 (13 cases)	3½–5 (10 cases)	3½ (2 cases)

The authors conclude that sulphathiazole is more effective than sulphaguanidine and that sulphanilamide is less effective than the other two drugs. They decided that sulphaguanidine was the choice in mild cases and in cases with dehydration and consequent risk of renal complications. Sulphathiazole was valuable in other severe cases notably because it relieved discomfort rapidly. They tried sulphapyridine but gave it up because it caused vomiting. Papers by Paulley [this *Bulletin*, 1943, v. 40, 241] and by Scadding [*ibid.*, 1944, v. 41, 755] are referred to. *J. F. Corson.*

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS.

Morgan, C. N. **Amoebiasis: some Difficulties of Diagnosis.** *Brit. Med. J.* 1944, Dec. 2, 721–2, 2 figs.

Amoebiasis produces diagnostic pitfalls and surprises. Colonic and rectal tumours, anal and perianal ulceration, recurrent colitis, enigmatic liver abscess are numbered amongst its sequelae.

There is evidence that the chance of cure bears an inverse relation to duration of symptoms before emetine treatment is commenced.

Sigmoidoscopic appearances are varied and the lesions are often minute and easily missed. In addition to the typical discrete ulcers, other changes may be seen, including scattered petechial haemorrhages without ulceration; deeply inflamed hypertrophic oedematous mucosa, which may be nodular to the touch; a large, solitary, irregular, indurated ulcer, infiltrating the rectal wall; or diffuse proctitis limited to the rectum.

The association of bacillary with amoebic dysentery should be remembered. The diffuse inflammation with irregular erosions, or large irregular flame-shaped submucous haemorrhages, may overshadow amoebic lesions; but sometimes discrete, clean-cut ulcers, identical in appearance with those of amoebiasis,

may be seen in bacillary dysentery. Not infrequently sigmoidoscopic findings are indefinite, so that re-examination after a course of sulphaguanidine, or, it may be, emetine, may prove necessary.

In amoebiasis, secondary manifestations may constitute the first indication of infection. A case is reported of an abscess and empyema treated by aspiration and rib resection; 22 days later rectal examination revealed an indurated, hypertrophic ulcer, which was diagnosed as an amoeboma and amoebae were cultured from the faeces. The discharge from the empyema quickly cleared up under emetine treatment. Amoeboma (or amoebic granuloma) results from repeated amoebic invasion of the colon with superadded pyogenic infection, and may produce a progressive inflammatory lesion. The inflammatory process spreads through the bowel wall into the pericolic and perirectal fat, and infiltrates surrounding structures. The resulting tumour consists of fibrous tissue, granulations and varying degrees of ulceration. There is considerable round-cell infiltration; lymphocytes and eosinophils are present in large numbers. Typical amoebic ulcers may be present, or no evidence of amoebiasis may be forthcoming. The usual sites are the rectum, recto-sigmoid junction and caecum. When the mass is situated on the recto-sigmoid junction or in the rectal ampulla, the patient complains of tenesmus and may pass blood and mucus.

Diagnosis from carcinoma of the rectum is difficult, sometimes impossible, by digital examination or by sigmoidoscopy. The dark-red nodular and ulcerated lesion looks like a carcinoma and, moreover, a smooth rounded non-ulcerated mass cannot be distinguished by these means from submucous spread of carcinoma. *Even when amoebae are found in the faeces* carcinoma cannot be excluded until a biopsy has been made. Carcinoma and amoeboma may coexist. In the early stages of tumour formation the whole mass will melt away after emetine treatment. A previous history of dysentery is suggestive, as in one case with pain in the anal region and retention of urine. Sigmoidoscopy showed a firm irregular tumour on the posterior rectal wall. After a course of emetine the tumour totally disappeared within one month.

But when the amoebic lesion has been present for a long period, the superadded result of secondary infection, fibrosis, and colonic distortion may prevent the disappearance of the mass after anti-amoebic treatment. In such cases excision of the tumour may be necessary, on account of obstructive symptoms, or because it may be impossible to exclude carcinoma.

A case is quoted of a man of 44 with dysenteric history, with increasing recurrent abdominal colic, and pain in the right iliac fossa, anorexia, and slight fever. A large, tender mass was palpable in the right iliac fossa. Amoebic ulcers were found in the rectum and active *E. histolytica* in the faeces. A large inflamed mass was found in the caecum, attached to the anterior and posterior abdominal walls with adherent coils of small intestine. Ileo-caecal resection, lateral ileo-colic anastomosis and drainage of retroperitoneal tissues became necessary. With 8 grains of emetine injected, and blood transfusions and iron for secondary anaemia, uneventful recovery ensued. Even after removal the tumour was thought to be an amoeboma till microscopic examination showed it to be an adenocarcinoma, grade II, with mucoid degeneration.

Differential diagnosis between amoebic typhlitis, acute appendicitis and abscess of the appendix presents difficulties. The typical history of appendicitis may not be obtained and obstruction of the lumen of the appendix may result from amoebic infection. Operation is undesirable in the presence of uncomplicated active amoebiasis of the caecum and appendix, but in spite of this surgical treatment must not be delayed, if signs of *obstructive* appendicitis are encountered within the first 24 to 36 hours, whether the patient has amoebic dysentery or not. When a mass is palpable in the right iliac fossa, though it may prove impossible to distinguish between an appendix abscess and amoebiasis,

the treatment should be observation and strict Ochsner-Sherren régime. Should further indications for surgical intervention arise, simple drainage with minimal disturbance of the inflamed mass should be undertaken. When amoebic infection is proved or suspected, emetine should be administered.

Painful anal fissures are sometimes due to amoebiasis of the skin. The edge of the ulcer is sharply defined, irregular and undermined. The base has a dirty yellow and unhealthy appearance. These ulcerations vanish dramatically soon after the administration of emetine. One case undergoing carbarsone treatment developed a typical amoebic anal ulcer which immediately healed with emetine. The danger of operating on haemorrhoids and fissures in patients with recurrent diarrhoea is emphasized. Sigmoidoscopy should be carried out before every rectal operation ; it is unwise to undertake even a minor rectal operation within six weeks of an attack of diarrhoea, and dysenteric infection must always be excluded. *P. Manson-Bahr.*

HALPERT, B. & ASHLEY, J. D., Jr. **Amebic Colitis complicated with Abscess of the Brain.** *Arch. Pathology.* 1944, Aug., v. 38, No. 2, 112–14, 1 fig.

Involvement of the brain in amoebiasis is a rare complication and usually associated with similar disease of the liver or of the lungs, or of both. Up to date 61 cases of amoebic abscess of the brain have been reported. Amongst these, the first two, without involvement of liver or lungs, were reported by KARTULIS (*Zentbl. f. Bakt.* (Abt. 1) 1904, v. 37, 527), the third by PUTNEY & BAKER (*Dis. of Chest*, 1938, v. 4, 20), the fourth by STEIN & KAZAN (*J. Neuropath. & Exp. Neurol.*, 1942, v. 1, 32) and the fifth is the present case in a man of 54 with amoebic dysentery of at least four years' standing. In spite of emetine and carbarsone therapy he relapsed, and was found in a semi-comatose dazed condition. Examination of the cerebrospinal fluid revealed a pleocytosis of 1,125 leucocytes per cmm. with numerous fresh red cells. The white cell count of the blood was 34,500 with polymorphs 87 and lymphocytes 13 per cent. Many active amoebae were present in the faeces.

On the assumption of meningococcic meningitis, sulphadiazine was administered without result. He was then transferred to the authors' care at the University Hospital, Oklahoma City. On admission, on February 20th, 1944, there was marked opisthotonos with positive Kernig & Brudzinski's signs. There was slight exophoria of the left eye. The deep tendon reflexes were diminished, with bilateral absence of knee jerks and an inconstant Babinski sign on the right. There were no ophthalmoscopic changes. A definite tache cérébrale was noted but X-ray examination of the skull revealed no abnormalities. The cell content of the cerebrospinal fluid was now 2,790 cells per cmm., the protein content was 70 mgm. per 100 cc. and the globulin reaction was 4 plus. After settling, the supernatant fluid assumed a xanthochromic tint. Later he became rational, but when attempting to sit up, fell backward and to the right. A cisternal puncture, on February 28th, two days before death, yielded more xanthochromic fluid.

At autopsy, 2½ hours after death, amoebic ulcers were present in the mucosa of the caecum, ascending colon and rectum. The cerebral convolutions were flattened and the sulci narrowed. There was a discoloured softened area in the right occipital lobe 5 cm. in diameter, and after fixation a cavity 5×3 cm., with ragged inner surface and tissue debris, was revealed. *Entamoeba histolytica* was demonstrated in the contents of the caecum as well as in the cerebral cavity. In preparations from the rectum the amoebae were less conspicuous.

The mechanism by which *E. histolytica* reaches the brain is not clear, particularly when there are no abscesses in lung or liver. Stein & Kazan suggested that

the organisms reach the brain through the vertebral system of veins demonstrated by Batson (*Ann. Surg.*, 1940, v. 112, 138) but this by no means explains why this occurrence is so rare and why it occurs so late in the disease.

[This paper is illustrated by admirable photo-micrographs of the amoebae in the brain as well as in the submucosa of the caecum.] *P. Manson-Bahr.*

Heilig, R. & Visveswar, S. K. **Liver Function in Amoebiasis and its Variations under Emetine Therapy.** *Indian Med. Gaz.* 1944, Aug., v. 79, No. 8, 345–9. [36 refs.]

A discrepancy exists between the facts that *Entamoeba histolytica* does not produce a toxin and the clinical impression that sufferers from acute or chronic intestinal amoebiasis look and behave as if they were toxic. Moreover, emaciation, sallow complexion and hyper-irritability (without clinical hepatitis), which disappear under emetine therapy, resemble closely the symptoms characteristic of hepatic deficiency.

Because of the paucity of data regarding estimations of liver efficiency in amoebic hepatitis this research was undertaken. Fifteen patients with acute and subacute amoebic dysentery and 11 with acute hepatitis were selected; they were free from ankylostomiasis and active malaria, but it was not possible to exclude urinary tract infections as these sooner or later eventuate (so it is claimed) in most chronic diarrhoeas. A liver function test was performed on admission, after six emetine injections, and again after 12 (*i.e.* a total of 12 grains). For estimation the original Quick's hippuric-acid test was adopted as the most reliable.

The procedure was that the patient received milk and bread at 7.0 a.m. An hour later the bladder was emptied and 6 gm. of sodium benzoate in 50 cc. of water were given, followed by 100 cc. of water. For the next four hours the patient was kept in bed without food or water. All the urine was collected in hourly samples, which were pooled and divided into two equal parts, in both of which estimations of hippuric acid were performed. Thereafter the urine was acidified with 1–2 cc. of dilute acetic acid, concentrated on an electric boiling water-bath until the final volume was reduced to 20–25 cc. After cooling, 1–2 cc. of concentrated hydrochloric acid were added, sufficient to impart a blue colour to congo red paper. Hippuric acid was allowed to crystallize out. The crystalline sediment was collected in a fluted filter-paper and washed frequently with small quantities of cold water. The total volume of the filtrate was measured in order to apply the solubility correction of 0·33 gm. per 100 cc. of the filtrate at 25°–26°C. The hippuric acid was dried and weighed to constant weight. To express the results in terms of benzoic acid, the figure for the weight of hippuric acid obtained was multiplied by 0·68.

Considering the figures obtained in amoebic dysentery cases before emetine treatment, 7 out of 15 showed moderate or considerable impairment of liver function, which on the average of this group amounts to 55·4 per cent. of normal. After the administration of 6 grains of emetine, the liver function of only 3 (out of 14) was below the lowest normal limits, the average increasing to 72·6 per cent., but by the end of the course 1 (out of 12) showed a definite pathological function, and the average efficiency rose to 80·2 per cent. On admission 1 case of hepatitis out of 11 showed definitely damaged liver function, but after 6 and 12 grains of emetine, all responded normally to Quick's test, and clinically, all showed satisfactory improvement.

In India many toxic factors are at work which diminish liver efficiency, and the lower limits are below that found by Quick in America.

The average efficiency of 55·4 per cent. in dysentery cases showed that a considerable amount of toxin is absorbed into the portal system during the course of amoebic dysentery. It is probable that these toxins are not produced by the amoebae, but the latter act as pace-makers for the bacterial flora which

are then able to exert their damaging effect on the liver. The assumption that bacterial toxins are responsible for functional liver damage in amoebic dysentery is in accord with the experience that such toxins contribute to the development of cirrhosis in experimental animals. A further proof that, not the amoebic, but the accompanying bacterial infection interferes with hippuric-acid synthesis in many cases of amoebic dysentery is the fact that amoebic hepatitis affects the liver functions less. These results confirm the view that liver-function tests rarely help in establishing an early diagnosis of amoebic hepatic involvement. A warning is issued that beneficial effects of therapeutic emetine dosage on liver function should not encourage the use of this drug in other forms of hepatic disease. *P. Manson-Bahr.*

BTESH, S. **On the Treatment of Chronic Amoebiasis.** *Acta Med. Orientalia* (*Palestine & Near East Med. J.*). 1944, July- Aug., v. 3, No. 4, 107–11.

Chronic amoebic infection of the intestinal tract is one of the most important therapeutic problems facing the medical practitioner in the Middle East. The condition is common in Palestine and constitutes 5–10 per cent. of admissions and is the cause of about one-third of the gastrointestinal complaints met with in hospital practice. Methods of treatment are all based upon the administration of drugs derived from ipecacuanha, iodine or arsenic. It soon became evident that, though emetine is efficient in the treatment of acute amoebic dysentery and of its extra-intestinal complications, its use in chronic amoebiasis was disappointing. Heroic doses have been given intramuscularly, and even intravenously, with unsatisfactory results. Emetine may kill the amoebae embedded in the intestinal submucosa, but it does not reach the encysted stage in the lumen. When given by the mouth emetine cannot be tolerated in therapeutic doses. Iodine, both in organic and inorganic forms, pushed to the limit of tolerance, is entirely without effect. Chiniofon (Yatren) is of definite value, and emetine bismuth iodide is perhaps the most effective single drug against chronic amoebiasis, but like vioform it is expensive. Yatren acts best in the form of a retention enema, as confirmed in practice in Palestine. The combination of this drug by the mouth and rectum has often resulted in eradication of *E. histolytica*, but it is not always well tolerated and the number of relapses is high. Iodoform (0·25 gm. in enteric capsules) has a definite amoebicidal action and has been tried in 60 cases. Though the therapeutic effects are at least as good as those of yatren, untoward results have been observed, such as skin rashes, diarrhoea, vertigo and even collapse.

Novarsenobillon and tryparsamide injections are entirely without effect; though stovarsol and carbarsone by oral administration are of definite value as adjuvants to other treatments, these are unable themselves to eradicate the infection, but result sometimes in symptomatic relief.

Several methods of treatment are based on the combination of two or more of the drugs already mentioned. There is the E.B.I. and yatren combination. CRAIG and others in U.S.A. prefer yatren and carbarsone. In Palestine it has been customary to administer E.B.I. and yatren in combination, followed by a course of stovarsol or carbarsone.

All combinations have been tried out and the highest percentage of success was obtained by the E.B.I.-yatren-carbarsone treatment, but it is expensive and entails hospitalization, followed by a considerable period of convalescence.

The author does not consider that we yet possess a practical and efficient treatment for chronic amoebiasis. The matter is further complicated by the fact that immunity to reinfection does not exist. Hence what may appear to be a relapse may be a reinfection.

After a considerable period of clinical experimentation the author evolved a mixture of powdered ipecacuanha and yatren as follows :—

Pulv ipecac 0·15 gm.
Yatren 0·4 gm.

The powder is given twice daily in cachets or gelatin capsules 3–4 hours after breakfast and dinner, followed by a fast of one hour at least. It is not advisable to permit the patient too much freedom of movement nor to administer the treatment to ambulatory patients. The treatment lasts 12–14 days and may be followed by a short course of carbarsone (2 tablets daily for 6–8 days).

In the majority cysts of *E. histolytica* disappear from the faeces within 8–10 days of treatment. Sometimes active amoebae appear on the sixth or seventh day. This observation is interpreted as suggestive that either the amoebae are unable to encyst or that the cyst wall is dissolved, but they eventually disappear.

Symptomatic relief is the rule within the first ten days. Out of 50 cases there has been one relapse only, which occurred within one month ; 20 were followed up for periods ranging from three months to one year. In all, repeated faeces examinations failed to reveal amoebae or cysts. Taking all the difficulties regarding " follow up " into consideration it is claimed that this treatment is at least as efficacious as any other. It is easy to administer ; toxicity and cost are relatively low. Slight diarrhoea is usually noted.

The most important sequelae encountered were, chronic appendicitis, chronic haemorrhagic proctitis and post-amoebic mucous colitis. Pathologically the appendix shows usually a normal mucosa with one or two islands of superficial ulceration. If it is removed before anti-amoebic treatment is given, amoebae may usually be found in the ulcers. For some reason the appendix does not show the retrogression of the ulcers observed in the sigmoid after treatment. In haemorrhagic proctitis a diffuse redness of the mucosa of the lower third of the rectum is observed. The real aetiology is not understood. Post-amoebic colitis does not differ from mucous colitis or " irritable colon." Amoebiasis may be the trigger which initiates colitis in a susceptible individual. Treatment is disappointing and the condition is aggravated by a repeat of the anti-amoebic treatment.

P. Manson-Bahr.

Das Gupta, N. C., Banerjee, P. K. & Sen Gupta, S. B. **Fulminating Types of Giardiasis simulating Asiatic Cholera and Acute Bacillary Dysentery.** *J. Indian Med. Ass.* 1944, Aug., v. 13, No. 11, 317–18.

The authors write that giardia is not only pathogenic but is steadily coming to occupy as important a position among the intestinal infections in tropical countries as *Entamoeba histolytica*. From the records of the Khulna District Board Laboratory in India it would appear that the incidence of *E. histolytica* infections is more or less stationary, while those due to giardia are increasing to such an extent that they have quadrupled in eight years. It is further noted that, like smallpox, both the protozoal infections have acerbations every four years. In some cases the flagellate produces symptoms of a fulminating type resembling Asiatic cholera or acute bacillary dysentery. To illustrate this the authors describe three cases in male subjects aged 8, 38, and 3 years respectively, in which violent diarrhoea started suddenly, developing, in one case, into a condition resembling cholera. In the others the stools contained mucus, and in all three red blood corpuscles and pus cells occurred in addition to giardia. In the first case the symptoms had lasted barely 6 hours when dramatic relief followed the administration of 0·03 gm. of atebrin musonate. An hour later there was only one motion and following 4 grains of stovarsol there was recovery next day. In the second case a rapid recovery followed the administration of stovarsol alone, while a similar result was obtained in the third case with atebrin

by the mouth. In the comments it is admitted that cases 2 and 3 showed a tendency to spontaneous abatement of symptoms before treatment was started. [It does not appear from the paper that other possible causes for the symptoms were excluded, and apart from the presence of giardia there is no evidence whatever that this flagellate was actually responsible for the choleraic condition in one case and the dysenteric condition in the others. It also seems doubtful whether the figures presented justify the statements made regarding the increase of the protozoal infection mentioned.] *C. M. Wenyon.*

RELAPSING FEVER AND OTHER SPIROCHAETOSES.

BÖGER, A. Die latente Rekurrensinfektion und das Rekurrensrheumatoid. [**Latent Relapsing Fever Infections with Rheumatoid Manifestations.**] *Münch. med. Woch.* 1943, Sept. 24, v. 90, No. 38/39, 549–52.

The author discusses the well known features of European relapsing fever and then gives clinical details of two cases in which the patients developed rheumatoid manifestations affecting especially the back, shoulders and thighs. Exacerbations of 2 to 5 days' duration, accompanied by slight fever, occurred at intervals of 6 to 14 days, and in some respects the manifestations recalled undulant fever. The nature of these infections was determined by the examination of stained blood films, especially thick drops, when spirochaetes were found, usually in small numbers. The cases responded to treatment with neosalvarsan.

The author mentions that in South Russia and the Caucasus, where the disease is endemic, many cases of relapsing fever occurred amongst the German troops. Concerning the prevalence of cases showing rheumatoid symptoms, 46 were noted during three months, including 18 at one station comprising 120 patients.

The method of transmission is said to be usually by the body louse, but the author considers that the bed bug may also be a carrier.

The main object of the paper, however, is to call attention to the rheumatoid manifestations that may accompany latent infections of the disease, and the necessity for careful blood examination for spirochaetes in all doubtful cases.

E. Hindle.

NÁJERA ANGULO, L. Transmisión del *Spirochaeta hispanica* por el método de Sparrow-Durand. [**Transmission of *S. hispanica* by Intra-Nasal Instillation.**] Reprinted from *Bol. Real Soc. Española Historia Natural.* 1943, v. 41, 527–30. [11 refs.]

The author has been able to infect white rats by intranasal instillation of a suspension of *S. hispanica.* *Charles Wilcocks.*

COHEN, H. G. **Rat Bite Fever. Contributions to its History and War Significance.** *Bull. History of Med.* Baltimore. 1944, July, v. 16, No. 2, 108–15. [26 refs.]

SENEKJIE, H. A. **The Clinical Manifestations of Leptospirosis in Louisiana.** *J. Amer. Med. Ass.* 1944, Sept. 2, v. 126, No. 1, 5–10, 1 fig. [Refs. in footnotes.]

A general account of this disease with special reference to clinical manifestations in Louisiana based on reports of 30 cases at the Charity Hospital New Orleans, during the past five years.

The incidence among the inpatients from 1939 to 1943 was one case of leptospirosis to 8,445 general admissions and one case to 1,343 general medical

admissions ; while in 1943 it was one case to 5,263 general admissions and one to 750 general medical admissions. Two of the patients were infected with *L. canicola*.

The onset of the disease was sudden in two-thirds of the cases, and enlargement of the liver and jaundice generally developed five to seven days after the fever, but two cases were anicteric. The van den Bergh reaction was direct ; the prothrombin time was prolonged and the hippuric acid excretion was reduced. In three of the cases the liver was not enlarged although jaundice was present. Splenomegaly was present in three, haemorrhagic phenomena in 16, and respiratory symptoms in 12 of the cases. There was electro-cardiographic evidence of cardiac lesions. All the patients showed evidence of varying degrees of pathological changes in the kidneys ; five had anuria ; 24 albuminuria with casts and blood cells ; three glycosuria ; and 25 leucocytosis. The kidney failure was accompanied by the retention of nitrogenous metabolites in the blood. The duration of the disease was three to six weeks and five of the cases were fatal. Most of the patients had a history of exposure to rats, or of coming into contact with water or food contaminated with the excreta of rats and possibly of dogs. Thirty out of 45 suspected cases were confirmed by laboratory methods. In seven cases *Leptospira* was found in the blood, in one it was present in the urine, and in another in the cerebrospinal fluid. In two fatal cases the organisms were found in Levaditi-stained sections of organs. In 24 cases diagnosis was established by agglutination reactions, the diagnostic titre ranging from 1 : 300 to 1 : 1,000,000. Treatment was symptomatic but one patient received 250 cc. of convalescent whole blood in the fourth week of the disease, with no appreciable results. *E.Hindle.*

YAWS.

CHAMBERS, H. D. **Juxta-Articular Nodules.** *Arch. Dermat. & Syph.* 1944, Aug., v. 50, No. 2, 105–6.

Observations on 128 patients with juxta-articular nodules were made while the author was attached to the Jamaica Yaws Commission [this *Bulletin*, 1935, v. 32, 883, 885]. The patients were seen in yaws-endemic areas in rural parts of Jamaica and had no history or signs of syphilis. Although yaws is commoner in males than in females, 91 of these cases were in females ; lesions were found in only nine children (six girls and three boys) under 14 years of age and in only 20 persons under 20 years of age. Tiny nodules may be felt as early as 1–2 years after infection with yaws, but they usually develop 15–40 years after infection. In one patient with multiple yaws lesions of the bones, juxta-articular nodules were present close to each affected bone.

Of the 128 patients, 110 gavé a history of yaws and 112 had a positive Wassermann reaction, while in seven it was negative. The numbers and positions of the nodules are shown in a table : there were 228 nodules, of which 95 were near the elbow, 89 near the knee, and 17 near the ankle.

" The response to specific treatment was definite although slow and long drawn out. Treatment with bismuth subsalicylate (10 per cent. in olive oil) was quite as effective at least as treatment with neoarsphenamine. . . . Small nodules of from one to three years' duration may be expected to disappear within six to twelve months." *J. F. Corson.*

CUPI, N. Primi casi di pian riscontrati nel Governo dell'Amara. [**The First Cases of Yaws in Amara**]. *Boll. Soc. Ital. di Med. e Igiene Trop.* (Sez. Eritrea). 1943, v. 2, No. 3, 45–50. English summary.

"The author publishes the first three cases of 'Pian' (yaws) diagnosed in the Amara province of Ethiopia."

LEPROSY.

DE SOUZA-ARAUJO, H. C. Culturas de bacilos ácido-álcool resistentes isolados de hematófagos infectados em leprosos. Evidências de se tratar do bacilo de Hansen. [**Cultivation of Acid-alcohol-fast Bacilli from Bloodsucking Insects fed on Lepers.**] *Mem. Inst. Oswaldo Cruz.* 1944, Feb., v. 40, No. 1, 9–31, 1 coloured pl. & 40 figs. English summary.

Work carried out by Professor de Souza-Araujo must always command respect and that described in this paper may have far-reaching results. The bodies of certain ticks, *Amblyomma cajennense*, *Boophilus microplus*, and of the bug *Triatoma infestans*, which had been allowed to feed on lepers four days before, were triturated in distilled water as a haemolysing agent, and inoculated on to Löwenstein's medium. In eight weeks or so signs of growth were observed. A well-reproduced coloured plate shows the culture tubes and stained bacilli. The cultures were pigmented, golden yellow, orange, or carrot yellow, and the organisms were acid-alcohol-acetone-fast. They exhibited very marked Brownian movement and "gave the impression of actual locomotion." Subculturing in glycerin media yields a film which can be used for antigen employable for skin reactions and consequently the author believes that he has succeeded in cultivating Hansen's bacillus. [See below.] *H. Harold Scott.*

DE SOUZA-ARAUJO, H. C. Preparo de antígenos (Leprolinas Souza-Araujo) de culturas de bacilos ácido-álcool resistentes isolados de leprosos. Seu emprêgo intradérmico, comparativamente com o da Lepromina, e subcutâneo ou intravenoso como tentativa teraêputica. [**Preparation of De Souza-Araujo's Leprolins.**] *Mem. Inst. Oswaldo Cruz.* 1943, Dec., 39, No. 3, 349–55, 5 figs. English summary.

In this contribution Professor de Souza-Araujo details his method of preparing the "antigens" from his cultures of acid-alcohol-resistant organisms obtained by allowing certain insects to feed on lepers. These antigens have been used for skin reactions and for comparing these with lepromin reactions [see JOSÉ MARIANO below]. Of the many cultures he has grown, only four give a film on glycerin broth sufficient to yield a serviceable antigen. On the advice of Dr. A. MACHADO of the Oswaldo Cruz Institute the following is the procedure adopted :—

1. To 120 cc. of the medium, with a thick deposit and complete rugose film of yellow colour, 0·66 cc. of liquefied phenol is added ; after vigorous shaking it is placed in the ice-chest for 24 hours.

2. The contents are then transferred to a 600 cc. flask, with 50 gm. of sterile porcelain beads and the flask is placed in an electric shaker for ten days and nights, by which time the product is a homogeneous, chocolate-coloured milky fluid.

3. A few drops of this are sown on Löwenstein's medium and on 5 per cent. glycerin agar and incubated for five days at 37°C., to test sterility.

4. To the emulsion of this 0·5 per cent. phenol is added in a proportion of 10 cc. to 100 cc. and the product is distributed in 2 cc. ampoules.

For comparative tests with lepromin these antigens are injected intracutaneously in doses of 0·2 cc. in the front of the arms, as related in the following abstract. The author has sent material for trial to various leprosaria and leper colonies, 17 altogether, five in S. Paulo, two each in Colombia, Pará, Paraná, Minas Gerais and elsewhere. Tests are also to be undertaken to determine their use therapeutically by injecting the leprolins into resistant lesions. *H. Harold Scott.*

Mariano, J. Resultados do emprêgo das leprolinas "Souza-Araujo" comparativamente com o da lepromina. [**Skin Tests with Leprolins as compared with Lepromin.**] *Mem. Inst. Oswaldo Cruz.* 1944, Feb., v. 40, No. 1, 101–19, 1 fig.

Tests have been carried out in lepers, in the stages mentioned below, using "leprolins" from five cultures from Professor Souza-Araujo [see above abstract] numbered 1 to 5, each injected intradermally, three on one arm, two on the other, injecting 0·2 cc.; in the sixth place lepromin was injected. The subjects were divided into ten groups according to clinical form and stage: L1, N1, N2, N3, L1N1, L2N2, L1N2, L2N1, L3N1 and L3N2.

The results of the hundreds of tests performed on these patients are presented in a series of Tables. For details those interested must consult the originals. Here we must be content with summarizing them:—

1. In 16 nerve cases, leprolin 2 was positive in 12, negative in 4, lepromin giving closely similar results, 13 and 3 respectively.

2. In 75 lepromatous cases, leprolin 3 (from *Amblyomma cajennense*) gave a negative in 59, positive in 16; lepromin gave 72 and 3.

3. Of 20 contacts and persons under observation, in apparent health, the results were again closely similar; leprolin 2 gave 12 positive, 8 negative, lepromin 13 and 7 respectively.

For better comparative estimation it will be advisable to carry out more tests with increasing doses of the leprolins to arrive at a standard product giving the best results and so be of value for prognostic purposes as an evaluation of the defences of the body. *H. Harold Scott.*

HELMINTHIASIS.

Krakower, C., Hoffman, W. A. & Axtmayer, J. H. **Defective Granular Eggshell Formation by *Schistosoma mansoni* in Experimentally Infected Guinea Pigs on a Vitamin C Deficient Diet.** *J. Infect. Dis.* 1944, May–June, v. 74, No. 3, 178–83, 1 fig.

In guineapigs experimentally infected with *Schistosoma mansoni*, and kept on a diet deficient in vitamin C, the authors found large numbers of eggs of this trematode which showed evidence of disintegration of their shells. In normal guineapigs, although tissue reaction may cause deformations (wrinkling, fractures, thinning) the egg shells remain refractile and homogeneous. The

disintegration of the egg shells was most marked in the eggs in the liver and lungs, where at times most of the eggs were so involved. Fertilized eggs with developing miracidia always retained intact shells.

The tissue reaction round the eggs in the guineapigs on scorbutic diet did not differ in any major way from that seen in controls, except that eosinophil response was less and there were haemorrhages.

The authors then enquired whether humoral or intracellular reactions due to deficiency of vitamin C might act upon a less defective or normal egg shell and cause its disintegration. Eggs were obtained free from all tissues by a method of sterile sedimentation, which is described, and these were injected subcutaneously into marked areas of guineapigs on a scorbutic diet ; one lot was given intratracheally, because most of the disintegrated eggs had been found in the liver and lungs. In several such trials granular disintegrated eggs were never found. From the second to the third month after injection of these eggs into guineapigs protected against scurvy, fewer and fewer eggs were found and the authors suggest that they were absorbed or dispersed and greatly reduced in volume by fibrosis and reorientation of the organized tissues [*cf.* KRAKOWER, HOFFMAN and AXTMAYER, this *Bulletin*, 1943, v. 40, 923].

Deficiency of vitamin C thus did not interfere with the development of *Schistosoma*, nor, to a certain extent, with fertilization or development of the miracidia, except when bacteraemia in the hosts infected the parasites.

There was no reason to suppose that any other vitamin was concerned in the changes observed. *G. Lapage.*

MAZZOTTI, L. Presencia de huevecillos de *Taenia* en la región perianal. [**Eggs of *Taenia* on the Perianal Skin.**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1944, June, v. 5, No. 2, 153–5. English summary.

"Sixteen patients harboring *Taenia*, were examined by Graham's method during several days. Out of 63 examinations 44 (70%) were positive, which show that the eggs were present on the skin of the perianal region of these patients."

RITTER, C. Solitäre und multiple Muskelcysticercen. [**Single and Multiple Cysticerci in Muscle.**] *Deut. Ztschr. f. Chirurgie.* 1943, June 22, v. 257, No. 9–12, 664–83, 1 fig.

Two cases of human infestation with cysts of tape worm are described and the subject is discussed in considerable detail. In one case, in a 12-year-old girl, a cyst of about the size of a cherry stone was removed from the right rectus abdominis muscle ; it was found embedded in the muscle without intervening connective tissue. Microscopical examination showed it to be *Cysticercus cellulosae*. The second case was in a middle-aged man who had broken his right femur 3 years before and who complained of such severe and prolonged pain that walking and working were very difficult. By interrogation and examination it was found that the pains were not confined to the right leg but were present all over the body ; X-rays showed that the fracture was firmly united and also showed, unexpectedly, the presence of numerous calcified cysticerci, widely distributed in the muscles of the body and especially numerous in the region of the adductor muscles of the right thigh.

The author discusses the various views on how man may become infected, the pathology, symptomatology, diagnosis, prognosis and treatment, quoting the findings of numerous workers. With regard to treatment, solitary cysts are removed by operation ; for multiple cysts there is no treatment.

J. F. Corson.

SMIRNOV, G. G. **On the Efficiency of Cutaneous Infection with Hookworm Larvae.** *C. R. (Doklady) Acad. Sci. de l'URSS.* 1944, v. 42, No. 1, 46–8. [In English.]

Continuing his studies on the rate of penetration of the skin of the hamster (*Mesocricetus brandti*) by larvae of *Ancylostoma duodenale* and *Necator americanus*, the author describes the method used. Entomological test-tubes measuring 12 by 2 cm. were filled to the brim with water and put in a water-bath at 40°C. Each was covered with a small piece of the freshly-removed abdominal skin of the hamster, all the pieces being taken from hamsters of the same age. The skin was stretched and fixed in place by a rubber ring. Counted larvae, generally between 500 and 600, were put on the skin with a pipette. After 15, 30, 45 and 60 minutes the number of larvae left on the skin was counted and also the number in the water beneath. The experiments were done in July at Tbilissi Tropical Institute and the laboratory temperature was 28–34°C.

The author discusses the thigmotactic and thermotactic responses of the larvae and their alternating periods of rest and activity and the bearing of these upon the varying rate of their penetration of the skin. *G. Lapage.*

PALMER, E. D. **A Consideration of certain Problems presented by a Case of Strongyloidiasis.** *Amer. J. Trop. Med.* 1944, July, v. 24, No. 4, 249–54. [25 refs.]

The author describes a case of infestation with *Strongyloides stercoralis* complicated by disseminated tuberculosis. The patient was a Polish junk-yard worker, aged 63, admitted to a hospital in Rochester, N.Y., complaining chiefly of "stomach trouble and diarrhoea," which began two weeks previously, when the patient also had sharp, non-radiating, periumbilical pain. He was acutely ill and his condition is described in detail. There was no eosinophilia and the number of leucocytes varied throughout the illness around the lower normal limit. Several direct faecal examinations failed to reveal any protozoa or nematode larvae or eggs; but on the sixth day examination by the zinc sulphate centrifugal floatation method revealed many larvae of *Strongyloides stercoralis*. On the seventh day the patient was started on a course of 0·06 gm. gentian violet in enteric-coated tablets, three times a day before meals; on the twelfth day he was also given 0·1 gm. gentian violet intravenously in a 0·5 per cent. solution. On the ninth day, when gentian violet first appeared in the stools, even direct stool examination revealed abundant larvae of *S. stercoralis*; but by the thirteenth day none was found even by concentration methods. The author emphasizes the need for concentration methods for the faecal examinations. The patient died on the fifteenth day, by which time he had had a total of 1·56 gm. of gentian violet by the mouth and 0·1 gm. intravenously.

At autopsy no evidence of pulmonary or intestinal infestation with *Strongyloides* was found; there were no adult or larval worms and no eosinophil tissue reaction. The author thinks that the gentian violet had eliminated the infestation [*cf.* v. ENGEL, this *Bulletin*, 1945, v. 42, 49].

The author concludes that the infestation was a chronic one and that it could have originated either in Poland or in Rochester. The patient had lived 33 years in Poland and 30 years in Rochester. If the infestation had been acquired in Poland, it must have persisted, by auto-infection or hyper-infection, for 30 years. Two records of infestations lasting 20 years are recorded, *viz.*, SCHÄFER and LODENKÄMPER, *Die Med. Welt*, 1935, v. 9, 1241) and BODON [this *Bulletin*, 1942, v. 39, 101]. But the patient might have been infested by his habit of lying on the ground in the Rochester junk-yard, although there was no evidence

of *Strongyloides* infestation in seven of his co-workers. The author reviews the literature of strongyloidiasis in the United States and concludes that further study is needed to determine the northern limit of the natural distribution of this parasite. Three cases of this infestation have been recorded in Rochester during the last three years. The author discusses the pulmonary lesions which the migrating larvae of *S. stercoralis* may cause [*cf.*, SILVEIRA, this *Bulletin*, 1945, v. 42, 46] and also the relation of this infestation to the generalized signs of tuberculosis present. He suggests that the recent migration of a significant number of *Strongyloides* larvae through the lungs may have been associated with the development of " the fulminating disseminated tuberculosis from an old inactive pulmonary process." Clinical examination had revealed an extensive old infection with fibrotic change and calcified lesions; tuberculous broncho-pneumonia was found at autopsy; and sputum, available for the first time two days before the patient's death, contained tubercle bacilli. Nine years previously the patient had, at the same hospital, undergone an ileotransverse colostomy. Examined then for acute intestinal perforation, much cloudy fluid was found in the abdominal and pelvic cavities and also a large, very hard mass, grossly resembling a carcinoma, involving the ascending colon and hepatic flexure, with hard nodes throughout the mesentery and an adherent omentum, but no perforation. The hard tissue was found to be organizing connective tissue with many round cells and fewer polymorphs, but there was no evidence of tuberculosis or worms in it. The patient had apparently remained well since this operation. The author quotes the statement of MACKIE (*J. Amer. Med. Ass.*, 1939, v. 112, 832) that he had not seen intestinal disease which could be with certainty ascribed to *Strongyloides* infestation. Palmer considers that the patient under consideration is a case in point. He comes to no conclusion about the possible part played by *Strongyloides* in the causation of this hard mass in the bowel, but quotes the work of BLACKLOCK and ADLER (*Ann. Trop. Med.*, 1922, v. 16, 283) on thickening of the jejunum of a chimpanzee due to *Strongyloides* and that of PRICE and DICKMANS (*J. Parasitology*, 1929, v. 16, 104) on multiple adenomata of the colon of a cat caused by an apparently new species of *Strongyloides*. *G. Lapage.*

CULBERTSON, J. T. & ROSE, H. M. **Chemotherapy of Filariasis in the Cotton Rat by Administration of Neostam and of Neostibosan.** *J. Pharm. & Exper. Therap.* 1944, June, v. 81, No. 2, 189–96, 3 figs.

Two antimonial drugs, stibamine glucoside (" neostam," Burroughs Wellcome & Co.) and metachlor-paracetyhaminophenyl stibiate of sodium (" neostibosan") were found to be particularly effective against the filarial worm, *Litomosoides carinii*, in cotton rats [*Sigmodon hispidus*]. The adult worms were killed in the pleural cavity and the microfilariae disappeared from the peripheral blood. Various experiments were made and the results are shown in tables [some have been previously reported, see this *Bulletin*, 1944, v. 41, 772]. The drugs were given by intramuscular injection instead of intravenously because the rats were difficult to handle. The dose of neostam was 40–60 mgm. for rats weighing 100–150 gm. In one experiment with 4 rats a single dose of 40 mgm. killed the adult worms in all the rats, but a few microfilariae were still present in the blood of one when it was killed after 76 days. Neostibosan was given in two courses of injections: 40 mgm. every day or two for 11 doses, then an interval of 26 days, then 80 mgm. every few days for 8 doses. The effects were similar to those produced by neostam.

Both drugs had also a powerful action *in vitro* on the adult worms; concentrations of neostam of 1 to 5 mgm. per cent. killed the worms in four days at 37°C. and one of 50 mgm. per cent. killed them within 24 hours. *J. F. Corson.*

Latienda, R. I. & Carpanelli, J. B. Apendicitis y oxyurus. [**Appendicitis and** *Oxyuris*.] *Rev. Asoc. Med. Argentina.* 1944, Aug. 15, v. 58, No. 539, 627–31, 6 figs. [33 refs.]

The authors describe eight cases in which *Oxyuris* was found in appendices surgically removed. The diagnosis of three cases was acute appendicitis, of one subacute appendicitis, of one chronic appendicitis and of one strangulated hernia. In one case *Oxyuris* was present in the wall of the appendix, in all the others the oxyurids were in its lumen. The histological picture was not typical. All the cases showed fibrolipomatosis of the appendicular submucosa, with many eosinophils and moderate reaction of the appendicular lymphatic tissue. The authors agree with other authors that the clinical picture presented is, in many cases, not justified by the lesions found. *Oxyuris* commonly occurs in the appendix without causing any symptoms. Appendicular inflammation may occur in any individual harbouring *Oxyuris*. The blood eosinophil count may be normal or low. Antiparasitic treatment should be given. Faecal examination should be done, but it may be negative because the eggs do not always appear in the faeces. Some of the literature dealing with the incidence of *Oxyuris* and the question whether it can cause appendicitis is discussed. [See also Rector, this *Bulletin*, 1943, v. 40, 927.] *G. Lapage.*

Pirot, R. & Bourgain, M. *Moniliformis moniliformis*, rencontré à Toulon dans l'intestin des muridés des navires de guerre. [*Moniliformis moniliformis* **found at Toulon in the Intestine of Rats from Battleships.**] *Ann. Parasit. Humaine et Comparée.* 1942–1943, v. 19, Nos. 4–5–6, 124–8, 4 figs.

The author found 50 specimens of this species, which belongs to the Class Acanthocephala, in 9 rats (*Mus alexandrinus*, *M. rattus* and *M. decumanus*) taken from one battleship at Toulon. There was a minimum of 5 worms per rat. The description of the worm does not differ from that given in text-books, but the following measurements may be recorded here : length of the worm 4·5 to 14 cm.; the diameter can reach 3 mm ; average length of the female, when full of eggs, 13 cm., and of the male 5–7 cm. Average length of the proboscis sheath : male 1·046 mm., female 1·112 mm. Average length of proboscis : male 448 microns, female 481 microns. Average length of the lemnisci : male 3·15 to 4 mm., female 7·55 to 8 mm. Hooks of both sexes 19–20 microns long. Eggs 107 to 118 microns (average 114 microns) long by 57 microns across the widest part of their elliptical shape. Three membranes cover the spined embryo in the egg. Embryo 80 to 91·2 microns long by 25 to 30 broad. For more detailed measurements the paper should be consulted.

The authors are studying the distribution of this species in the Toulon region in the rats and in the intermediate host (cockroach). [Craig and Faust (*Clinical Parasitology*, 3rd ed., 1943, p. 467) state that apparently authenticated cases of human infection have been reported from Italy, the Sudan and British Honduras.] *G. Lapage.*

DEFICIENCY DISEASES.

Wilkinson, P. B. **Deficiency Diseases in Hong-Kong.** *Lancet.* 1944, Nov. 18, 655–8.

" Today poverty is probably more widespread and more devastating in its effects in China than anywhere else in the world." The diets are defective both in northern and southern China ; in the former, calcium, vitamins A, B, C and

probably D are deficient; in the latter, first-class protein, vitamins A, B_1, B_2 and possibly D. Food habits of these peoples are also factors in inducing deficiencies and attention is called to the well-known difficulty of attempting to effect any change. Night blindness, hyperkeratosis, infantile and adult rickets, scurvy, pellagra and beriberi are all found in northern China, while in southern China " beriberi abounds and coexists with pellagra and certain other syndromes probably caused by lack of part of the B complex " ; scurvy, rickets and eye changes found in vitamin A deficiency are not common. The increase in beriberi is reflected in the admission figures with deaths for Hong Kong : 1937—2,869 (928) ; 1938—5,373 (1,885) ; 1939—8,518 (2,061) ; 1940—15,129 (4,300). Latent and minor beriberi is very prevalent though not shown in these figures ; on the other hand fulminant cardiac beriberi is uncommon in S. China and Hong Kong. Emphasis is laid on the necessity of high dosage in these cases of acute cardiac beriberi—50 mgm. thiamin intravenously 3 times in the first 24 hours and thereafter once daily until full cardiac response is obtained.

Pellagra broke out suddenly in April 1940 ; nearly 1,000 cases occurred in one province in the next four months, with 50 per cent. mortality among the population which was existing on a diet of rice, salt fish and vegetables. It is stated " No signs of organic involvement of the nervous system were seen, but nervous symptoms were prominent . . . . It is interesting that 253 patients out of these 420 [cases recorded by HUA & CHENG, this *Bulletin*, 1944, v. 41, 419] showed signs of beriberi." Only two cases of " pellagra sine pellagra " were seen, but " two other syndromes deserve mention here because they are probably pellagrous, if indeed they are not just unusual types of pellagra itself." Of the first " the outstanding signs and symptoms were angular stomatitis, glossitis [of a dusky bluish red], scrotal eczema, giddiness and weakness of the legs." " Occasionally one of these patients would complain of dimness of vision; but this was rare . . . . The signs of cord involvement were present in a considerable percentage of the men." These cases responded to marmite and are recognized as identical with those described by LANDOR and PALLISTER in 1935 [*Bulletin of Hygiene*, 1935, v. 10, 733]. The authors add " it is tempting to speculate on the possibility of its being a pure ariboflavinosis " [as others have already done].

" The other pellagra-like syndrome was first noted in June, 1940, when classical pellagra was rampant [WILKINSON & KING, this *Bulletin*, 1944, v. 41, 687] . . . its outstanding feature was a rapidly oncoming, painless reduction of visual acuity associated with a well-marked concentric constriction of the fields of vision . . . . Common associated symptoms were giddiness, acroparaesthesiae, palpitation, and weakness and puffiness of the limbs," sore tongue and angular stomatitis, but no dermatitis. The second syndrome apparently responded to riboflavin or nicotinic acid. Scurvy and rickets were rarely seen.

Xerophthalmia occurred during 1939–40 but was not common. Bitot's spots, on the other hand, were quite common, associated often with lichen pilare [*sic*] most commonly on the arms, forearms, thighs and popliteal fossae. This eruption was a follicular hyperkeratosis associated with dryness of the skin, but no pustulation or pigmentation, and was commonest in the 15–25 years age group. *H. S. Stannus.*

FASAL, P. **Clinical Manifestations of Vitamin Deficiencies as observed in the Federated Malay States.** *Arch. Dermat. & Syph.* 1944, Sept., v. 50, No. 3, 160–66, 6 figs. [Refs. in footnotes.]

During the years 1939–41 nutritional surveys were carried out ; organized by Dr. A. Neave KINGSBURY, Director of the Institute for Medical Research, Kuala Lumpur. Dr. FASAL assisted in carrying out the work (*vide* Ann. Med. Reports). Four thousand Malay and 6,000 Indian children and young adults

were examined. The Malay children were seen at some 36 schools with a population of from 30–300; the Tamils on some 60 plantations where their parents worked. The results in tabular form were as follows:—

	Total examined	Phrynoderma	Bitot's spots	Angular stomatitis
		Per cent.	Per cent.	Per cent.
Malay	1,482	2·0	2·9	4·7
Tamil (Indian)	3,657	25·6	8·0	22·2

In mild cases of phrynoderma the changes in the skin resembled those of ichthyosis except that the palms and soles were not affected. The lesions in the severer cases, both in character and distribution, resembled those already described many times by other writers—follicular keratosis. The greater incidence of this condition in the Tamils as compared with the Malays makes an interesting contrast, the same being true for Bitot's spots and angular stomatitis, all easily accounted for by the poorness of the diet of the Indian compared with that of the Malay.

With vitamin A the skin lesions improved rapidly, the preparation used being locally-produced red palm oil with a vitamin A equivalent of 1,000 i.u. per cc., given by mouth or applied locally. As a control it was shown that coconut oil (which contains no vitamin A and no carotene) had no effect. There are some cases, however, which do not improve unless the intake of protein is increased and B complex given.

The angular stomatitis cleared up with B complex or riboflavin. There are some most excellent photographs of the dermatosis and of a section of the lesion, of Bitot's spots and angular stomatitis. *H. S. Stannus.*

FEHILY, Lydia. **Human-Milk Intoxication due to B_1 Avitaminosis.** *Brit. Med. J.* 1944, Nov. 4, 590–92. [20 refs.]

In this paper Dr. Fehily returns again to the subject which she has been studying for some years past and the points she brings forward help greatly in elucidating an obscure condition which has gone by the name "infantile beriberi." She adduces evidence to show that this name is not a good indication of the true state of affairs; the condition is rather an intoxication (sometimes acute, at others chronic) of infants by a poison in the breast-milk of mothers in a state of B_1 avitaminosis [see this *Bulletin*, 1941, v. 38, 282; 1942, v. 39, 332, 784; 1944, v. 41, 142]. One of these poisons, perhaps the chief, is methylglyoxal (pyruvic aldehyde). The term "breast-milk intoxication" suggested by ITO in 1911, or "human-milk intoxication" suggested by the author, is, therefore, preferable to "infantile beriberi." The symptoms are fairly definite: vomiting, abdominal pain, diarrhoea and meteorism, perhaps with stiffness of the neck and limbs and convulsions, coming on soon after breast-feeding; such may be fatal; the less acute show oedema, oliguria, aphonia, enlarged liver, dilated heart and marasmus. At the beginning of the intoxication the infants are often fat, flabby, and restless and many suffer from bronchitis and bronchopneumonia. The overfed suffer most because they ingest more of the poison.

During 1929 as many as 18 per cent. of infants under the author's observation at a welfare centre in Hong Kong showed signs of this milk-intoxication and 25 per cent. of the mothers had early symptoms of avitaminosis B_1. At autopsy little may be found; some degree of oedema of brain, larynx and lungs, serous

effusions and enlargement of the right side of the heart ; but at times nothing sufficient to account for death, which may then be ascribed to overlaying, asphyxiation from charcoal fumes or poisoning by native medicines. Women in Hong Kong often live on the borders of avitaminosis B_1 from eating highly polished rice, and when they become pregnant the danger becomes greater owing to increased intake.

These cases are not, however, confined to Hong Kong or the Far East ; they have been reported from Palestine, Rumania and America and probably occur elsewhere, " wherever B.B.S. [intermediary metabolites known as ' bisulphite-binding substances '] are increased in the human body " and this may occur not only in B_1 avitamonosis but also in other conditions of toxaemia, such as diabetes, uraemia and epidemic dropsy, for example. [A considerable part of the information in this article was covered by STANNUS in a paper published in the *Lancet* in June, 1942. Stannus deals, however, more with the chemical aspect, Dr. Fehily with the clinical as met with in her experience in Hong Kong. In her list of references Dr. Fehily omits to mention the paper by Stannus].

H. Harold Scott.

BONNARD, Augusta. **Supplement to Breast-Feed.** [Correspondence.] *Brit. Med. J.* 1944, Nov. 25, 707–8. [Summary also appears in *Bulletin of Hygiene.*]

The paper by FEHILY [above] has prompted the author to call attention to the effects on the child of protein deficiency in the mother's milk, a condition that is becoming increasingly common nowadays under rationing conditions. This qualitative change is partly attributable, in the author's opinion, to the effect on the mother's diet of such " food fads " as refusal of fish and cheese and sharing the pint of milk ; it may also be associated with imperfect recovery from childbirth. Test feeds may show that the milk is adequate or even abundant in quantity. In the welfare clinics attended by the author, about one " new " baby in six suffers from the effects of this deficiency in the mother's milk. The child feeds voraciously but is not satisfied ; it is restless, irritable and sleeps badly and gains little, if any, weight. The stools are dark green and contain curd and sometimes slime.

An immediate cure is brought about by supplementing the mother's milk with small amounts of cow's milk ; for a child a month old one tablespoonful is given thrice daily, and at no suckling age is it necessary to give more than 4 tablespoonfuls four times a day. Within a week the child may gain 8–12 oz. in weight, the stools become normal and the other symptoms disappear. [The author gives no figures of milk analyses in such cases.] *J. F. Corson.*

TOMASSI, G. Studi sulla vitamina " C " in Eritrea. Nota 4. Considerazioni cliniche sullo scorbuto in Eritrea. [**Studies on Vitamin C in Eritrea. 4 Clinical Scurvy.**] *Boll. Soc. Ital. di Med. e Igiene Trop.* (Sez. Eritrea). 1943, v. 2, No. 1, 87–90. English summary (6 lines).

The natives in Africa rarely suffer from scurvy, but when they are recruited by Europeans for work and their diet is changed or the food not properly prepared, being overcooked, for example, signs of scurvy may make their appearance In 1940–42 the author observed " about 140 cases." The patients were flabby and undernourished, drowsy, with fleeting rheumatic pains ; swollen gums were present in about 70 per cent., and in some the teeth were falling out ; occasionally petechial haemorrhages and even larger haemorrhagic effusions were seen in the calves, legs, feet and trunk ; rarely epistaxis and melaena. Thirty per cent. had hemeralopia and 90 per cent. follicular keratitis, signs of avitaminosis

A. The symptoms cleared up in a fortnight on treatment with the appropriate vitamins. The natives habitually use red pepper in quantity and the author believes that this in great part accounts for their freedom from scurvy under natural conditions. *H. Harold Scott.*

HAEMATOLOGY.

McGavack, T. H. & German, W. M. **Sicklemia in the Black Carib Indian.** *Amer. J. Med. Sci.* 1944, Sept., v. 208, No. 3, 350–55, 1 fig. [28 refs.]

"In wet, unstained preparations, the red blood cells of 24 of 300 Carib Indians of Honduras, Central America, showed the sickling phenomenon within a period of 24 hours. The sex and age incidence are noted. None of the individuals who showed sickling could be proved to have had active episodes of sickle cell anemia at any period of life. The significance of the findings is discussed, particularly in relation to the hereditary racial nature of the disease and the sickling trait, and the environmental influences which may play a part in precipitating the crises."

Segura, G., Radice, J. C., Donin, L. & Giusti, C. L. Estudio anatomo-patologico del primer caso argentino de anemia falciforme. [**The First Case of Sickle Cell Anaemia in Argentina.**] *Rev. Asoc. Med. Argentina.* 1944, Sept. 15, v. 58, No. 541, 731–9, 9 figs. [42 refs.]

Brugsch, H. G. & Gill, Dorothy. **Polyarthritis in Sickle-Cell Anemia.** *New England J. of Med.* 1944, Aug. 24, v. 231, No. 8, 291–2.

"Four cases of sickle-cell anemia are discussed in which the diagnosis was obscured by the presence of polyarthritis and heart murmurs simulating rheumatic fever."

Majumder, D. N. & Das Gupta, C. R. **Haematological Studies in *Silenus* (*Macacus*) *rhesus*. Part I. The Blood Picture of the Normal Monkey.** *Indian J. Med. Res.* 1944, May, v. 32, No. 1, 101–4, 8 graphs.

VENOMS AND ANTIVENENES.

Sergent, Et. L'action du sérum antiscorpionique est renforcée quand on injecte en même temps de l'eau salée. [**The Action of Scorpion Antivenene is Reinforced by Simultaneous Injection of Physiological Saline.**] *Arch. Inst. Pasteur d'Algérie.* 1943, Mar., v. 21, No. 1, 24–7.

Previous work has shown that injection of physiological saline alone, in animals injected with fatal doses of viper or scorpion venom, will prevent death in 27·4 per cent. The author records one human case of scorpion sting, in which subcutaneous injection of 100 cc. apparently led to recovery although the patient was *in extremis*. In another case this treatment was ineffective. He also quotes success in four of five cases treated with scorpion antivenene (20–40 cc.) and with physiological saline, administered separately, in subcutaneous doses of 150–500 cc., or (in one) an intravenous dose of 10 cc. antivenene diluted with 10 cc. saline. In 109 mice treated, after injection of a fatal dose

of venom, with serum alone, 78·8 per cent. recovered; in 105 treated with serum and saline, 85·7 per cent. recovered. The advice is therefore given that, in addition to antivenene, saline can, with benefit, be used in human cases.

Charles Wilcocks.

DERMATOLOGY AND FUNGOUS DISEASES.

BYRNE, E. A. J., with the assistance of J. H. CROXON. **Bactericidal and Fungicidal Action of Organic Mercurials with special reference to the Dermatomycoses.** *Indian Med. Gaz.* 1944, Aug., v. 79, No. 8, 357–61. [12 refs.] Also in *Indian Physician.* 1944, Sept., v. 3, No. 9, 277–85. [14 refs.]

After discussing the history, chemical and physical properties of these substances, the authors describe the three types of base in which they incorporated either phenyl mercuric chloride (P.M.C.) or phenyl mercuric acetate (P.M.A.). The following formulae are given for the chloride :—

Phenyl mercuric chloride	... 0·20 per cent.
Eucerin	... 3 parts
Distilled water	... 5 parts
or	
0·5 per cent. of the salt impregnated on Calamine B.P.	... gr. 15
Glycerin	... m. 30
Zinc oxide	... gr. 30
Water	to oz. 1

The acetate is used as—

Phenyl mercuric acetate	... 0·125 per cent.
Eucerin	... 3 parts
Distilled water	... 5 parts
or	
Phenyl mercuric acetate	... 0·05 per cent.
Sterile distilled water	... oz. 1

Full dispensing details are given in each case. [The percentages of the organic mercurials in the formulae presumably represent final concentrations in the preparations.]

Cases of ringworm of the trunk and limbs (115 in number) and those of tinea cruris (62) were apparently cured after only one application of either 0·20 per cent. P.M.C. or 0·125 per cent. P.M.A. for three to four hours. Early examples of tinea pedis (20) required two to five days. It is stressed that older keratotic and fissuring cases do not react so well, and indeed usually show later relapse. "Jungle sores" healed after preliminary application of 1/2,000 P.M.A. with subsequent use of elastoplast.

Sydney Thomson.

GONZÁLEZ OCHOA, A. & RUILOBA, J. Acción del propionato de sodio "in vitro" sobre *Actinomyces mexicanus* y *Cephalosporium* sp. Ensayo terapéutico en micetomas producidos por estos hongos. [*In vitro* **and Therapeutic Trials of Sodium Propionate against** *Actinomyces mexicanus* **and** *Cephalosporium* **sp.**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1944, June, v. 5, No. 2, 83–6, 2 charts. English summary.

The therapeutic trials were unsuccessful.

De Almeida Prado, A. Blastomicose do pulmão e das capsulas suprarrenais. Sindromo de cardiaco negro. [**Blastomycosis of the Lungs and Suprarenals. Syndrome of Cardiaco Negro.**] *Rev. Asoc. Med. Argentina.* 1944, Sept. 30, v. 58, No. 542, 789–93, 6 figs. [11 refs.]

" Cardiaco negro " is the name given to the condition in which the patient has almost a black appearance owing to intense cyanosis such as occurs in congenital pulmonary stenosis or in acquired stenosis of the pulmonary arteries, usually syphilitic in nature, Ayerza's disease, or, better, Ayerza's syndrome. The patient in this case was a Portuguese, 50 years of age, who was admitted with orthopnoea and intense dyspnoea, oedema of limbs and face, an intractable cough, widespread cyanosis, intense venous engorgement ; the heart was enlarged, globar in outline, the lungs showed basal oedema, liver enlarged to three fingers'-breadths below the costal margin, ascites present and abdominal wall oedematous. The patient died the same night in a " heart attack." Autopsy revealed a healed mycotic scar on the nasal septum (the patient mentioned that he had had this trouble two years before coming to hospital) a generalized pulmonary fibrosis with foci of hepatization, bullae and emphysema, and necrotic nodules, lemon-yellow in colour and varying in size from millet to " half a grape." The coronary vessels were thickened and patchy with atheroma ; the pleurae were thickened and on section showed irregular gumma-like nodules. The suprarenals were enlarged with nodules like those in the lungs.

The author adds remarks on blastomycosis in general. He divides it into three groups : (1) *Cryptococcus dermatitidis*, the mycoderma of Gilchrist and Stokes. (2) Coccidioidal granuloma of Gilchrist and Rixford, caused by *Coccidioides immitis*. (3) Paracoccidioidal granuloma due to *Paracoccidioides cerebriformis*, or *P. brasiliensis*. He thinks the present case belongs to this third group. [See this *Bulletin*, 1928, v. 25, 32, 746 ; 1938, v. 35, 924 ; 1941, v. 38, 94.]

H. Harold Scott.

Ascher, L. **Two Cases of Pulmonary Blastomycosis in Brothers.** *Harefuah.* Jerusalem. 1944, Oct. 1, v. 27, No. 7. [In Hebrew 124–5. English summary 125.]

Zozaya, J., Varela, G. & Castro Estrada, S. Tratamiento del pinto con penicilina (Nota preliminar.) [**Treatment of Pinta with Penicillin.**] *Rev. Inst. Salubridady Enfermedades Trop.* Mexico. 1944, June, v. 5, No. 2, 87–9. English summary.

" Penicillin applied to a patient with Pinto, caused the disappearance of *Treponema carateum* from the skin, 8 hours after the administration of 50,000 Oxford units."

HEAT STROKE AND ALLIED CONDITIONS.

Ladell, W. S. S., Waterlow, J. C. & Hudson, M. F. **Desert Climate : Physiological and Clinical Observations.** *Lancet.* 1944, Oct. 14 & 21, 491–7 ; 527–31, 7 figs. [20 refs.]

" 1. During the summer of 1943 observations were made in a desert climate on fit soldiers and on cases of effects of heat admitted to a military hospital.

" 2. All the fit men observed lost some weight in the hot weather. The loss was greatest in those who had the highest chloride concentrations in their

sweat. It is suggested that this loss was due to a minor degree of salt-deficiency dehydration ; calculations based on the measured rate of sweating and the estimated salt intake indicated that subjects with a high concentration of chloride in their sweat (*i.e.* above 0·3 per cent. NaCl) may not always have been in salt balance. Evidence of a salt-deficiency dehydration was provided by the following findings : low urine output in spite of a high water intake ; low urinary chloride output (less than 2 g. a day in some cases) ; and raised blood urea. No changes were found in the haemoglobin or in the blood and plasma chlorides. Blood-pressure fell as the weather grew hotter, but there was no evidence of cardiovascular inefficiency.

" 3. Twelve cases of hyperpyrexia are described ; these conformed to previous descriptions. The onset was acute, with absence of sweating and loss of consciousness. These cases all went through a phase of apparent negative water balance ; they excreted large quantities of dilute urine, at a time when they were drinking very little. During this phase the chloride content of the blood was diminished. These findings support the view that hyperpyrexia is accompanied by superhydration.

" 4. Two distinct types of heat exhaustion were seen ; these have been designated types I and II.

" 5. Cases of heat exhaustion type I were seen mainly in the first half of the summer, and at the peaks of external temperature. Vomiting and cramps were common in these patients. On admission the patients were pale, collapsed and sweating profusely. The blood-pressure was occasionally low, but the most consistent abnormality was a reduction in pulse-pressure ; on standing the blood-pressure fell and syncope occurred. Chemically, heat exhaustion type I was a salt-deficiency dehydration ; plasma and whole-blood chlorides were grossly diminished, haemoglobin and plasma protein were raised, blood-urea was very high, extracellular fluid and plasma volumes were diminished, and the urine was scanty, of high specific gravity, and almost free from chloride.

" Treatment of these patients consisted in replacement of salt and water. In severe cases intravenous saline was given with excellent results. The patients gained weight rapidly, indicating retention of water and salt. There is evidence that type I heat exhaustion occurs in persons who habitually secrete sweat containing a much higher concentration of chloride than the average ; their salt intake is inadequate at high rates of sweating, and they become salt-deficient. Prevention of these cases might be achieved by increasing the salt intake of all men, but this would probably be impracticable. Potential cases could be picked out and treated before they became casualties by following the body-weights and the urinary chloride (by some simple test) of all men exposed to risk. Any man who is consistently losing weight and is excreting a concentrated urine with low or absent chloride should be regarded as a potential case and given extra salt.

" 6. Cases of heat exhaustion type II were seen only in the second half of the summer, among men who had already come through the hottest weather unscathed. Clinically, they were characterised by defective sweating and polyuria ; the skin was always more or less severely affected by prickly heat in the healing and desquamating stage. Vomiting, cramps and cardiovascular abnormalities were not present. Chemically, these cases were salt-deficient, but not so grossly as those of type I, and they were not dehydrated. During convalescence they were found to secrete a sweat with a high concentration of chloride ; but it is not believed that this was habitual.

" The general picture suggests a breakdown of the defence mechanism of the body against heat. Signs of a similar breakdown were found in some of the fit men observed, in that during the second half of the summer their sweat was richer in chloride than it had been during the first half.

"The incidence of heat exhaustion type II could probably be reduced if men—particularly those suffering from severe prickly heat—were given a break of a few days in a cooler climate after 8 weeks' continuous exposure to extreme desert conditions."

MACQUAIDE, D. H. G. **Congenital Absence of Sweat Glands.** *Lancet.* 1944, Oct. 21, 531–2.

The term "hereditary ectodermal dysplasia of the anidrotic type" was suggested by WEECH (*Amer. J. Dis. Children*, 1929, v. 37, 766) for a condition which has the following main features: total absence of sweat glands and, occasionally, of subaceous glands; dental dysplasia; atrophic rhinitis and depressed nasal bridge; thick protrusive lips; prominent supraorbital ridges; growth of fine, scanty, lanugo hair; a dry, smooth, thin skin with frequent papular eruptions, especially on the face and the back of the neck and shoulders.

The author describes two cases, both in young airmen, which presented some of these defects, including inability to sweat when tested by being placed, wrapped in a blanket, under a heat cradle. In one patient a biopsy of the skin showed complete absence of sweat glands. Both patients felt discomfort in hot weather and used to dip their hands in cold water to relieve it; both had scanty hair on the head and body, rhinitis, deficient dentition, and protrusive lips. One had never shed tears but in the other lachrymation was normal. X-rays showed enlarged nasal fossae, small and absent frontal sinuses, respectively, and no unerupted teeth. Intelligence was above the average in both. There was no evidence of ectodermal defects in other members of either family.

Both were considered to be permanently unfit for service in the tropics.

J. F. Corson.

HENSCHEL, A., TAYLOR, H. L., BROZEK, J., MICKELSEN, O. & KEYS, A. **Vitamin C and Ability to Work in Hot Environments.** *Amer. J. Trop. Med.* 1944, July, v. 24, No. 4, 259–65. [22 refs.]

This work unites two lines of research that have been pursued in recent years at the University of Minnesota—on the results of exposure to heat, and on the concentration of vitamins in sweat. Several authors have recently claimed that extra amounts of vitamin C are required at high environmental temperatures, particularly when physical work is done. The experiments described below were undertaken to test this view.

Forty-four men were exposed to dry heat (112°–122°F. by day, 85°–90°F. by night, with a relative humidity of about 30 per cent.) for periods of up to 3½ days. The diet, which was rigidly controlled, contained 20–40 mgm. of vitamin C daily. Half the men were given a daily supplement of 500 mgm. ascorbic acid. The subjects worked for two hours each day on a treadmill, at an oxygen-consumption of about seven times basal. Measurements were made of pulse-rate, "Crampton score," rectal temperature, rate of sweating, water intake, urine output, and weight-loss. In some experiments strength of grip and of back lift was measured with dynamometers, and psychometric functions were tested by coordination tests and measurements of flicker fusion frequency. The concentration of ascorbic acid was estimated in urine, plasma, and sweat.

No statistically significant difference between the high-C and low-C groups was found in any of the variables measured, except in the ascorbic acid content of plasma and of urine. The average ascorbic acid concentration in the sweat was the same in the two groups—0·06 mgm. per 100 ml. In one experiment half the subjects were put on a low chloride intake of 6 to 8 gm. daily. Of 13 men in this group, six developed signs of heat exhaustion. Three of these were in the low-C and three in the high-C group.

[These experiments were carefully controlled, and it can be concluded that in short exposures to dry heat, an extra intake of vitamin C in well-nourished men, neither improves performance nor protects against heat exhaustion. It must, however, be emphasized that in this work there was no question of vitamin C deficiency. The intake of 20–40 mgm. is described as " moderately low " ; at its worst, it is little below the amount—25–30 mgm.—which has been laid down as the minimal daily requirement. Furthermore, until the beginning of the experiments, the subjects had been receiving 60–90 mgm. of ascorbic acid daily. Their state of vitamin C nutrition must therefore have been good. Recent surveys, both in civilians and in Service personnel, have shown that an intake of less than 20 mgm. of C daily may be found without apparent ill-health. It cannot, however, from the published evidence, be stated conclusively that such low intakes over a long period do *not* lead to deterioration of performance, as measured by physiological and psychometric tests. If such deterioration did occur on inadequate intakes, it would be hastened and intensified by heat. When the rate of sweating is 7 litres a day, as is quite possible in a desert climate, the loss of vitamin C in the sweat would, from the figures given, be of the order of 5 mgm. daily. This might be enough to convert a marginal intake into one that was definitely inadequate.] *J. Waterlow.*

MISCELLANEOUS DISEASES.

RANSOME, G. A., GUPTA, L. M. & PATERSON, J. C. S. **The Transnasal Intragastric Ryle's Tube in Tropical Practice. A Life-saving Measure.** *Brit. Med. J.* 1944, Nov. 4, 594–6.

The use of Ryle's stomach tube for treating dehydration in patients in the tropics has proved to be extremely valuable ; in many cases it is a life-saving measure. The technique of passing the tube is not difficult and is quickly learned by the nursing staff. No patient is too ill to have a tube passed. The authors describe the procedure in three groups of cases : (1) where the swallowing reflex is present, (2) when it is absent, as in deep coma, and (3) in refractory patients. The patency of the tube is tested with water and it is then lubricated, preferably with liquid paraffin. When analgesia of the nose and palate is desirable, it can be obtained by spraying with a 5 per cent. solution of percaine. The patient sits up, if possible, and the tube is passed ; in Group (1) when the tube reaches the throat it causes coughing, retching and swallowing and it is then easily pushed down the oesophagus ; in Group (2) it is guided past the epiglottis with the fingers ; in Group (3) struggling is avoided by injecting a barbiturate (evipan sodium) or by producing twilight sleep with sodium luminal or scopolamine-morphine. The free end of the tube is fixed to the forehead by strapping and is closed with a clip or by tying it. The tube may be left *in situ* for several days, or even longer, without producing any ill effects. It saves the nurses much work and is comfortable to the patient ; respiration is not embarrassed in lung cases. In the tropics fluid loss may amount to 10–15 pints ; adequate fluid intake can be ensured without risk of causing pulmonary oedema. Although water absorbed from the alimentary canal causes rapid diuresis, physiological saline has not this effect.

The authors have used the tube in a series of 355 acute medical cases in tropical practice during the past year ; the cases included " malaria and black-water fever, cerebral malaria (over 100 cases), cerebrospinal meningitis (65 cases), enteric fever and typhus, pneumonia, psychosis, and coma due to other causes *e.g.*, head injuries." The authors emphasize its value in malarial coma where,

owing to the reduction of serum albumin, intravenous saline infusion involves the risk of pulmonary and secondary cerebral oedema. In cerebrospinal fever its use enables an adequate amount of fluid to be given during treatment with sulphonamides, and is now a routine procedure in the authors' treatment of this disease. *J. F. Corson.*

SAMS, C. F. **Medical Problems in the Middle East.** *Ann. Intern. Med.* 1944, Aug., v. 21, No. 2, 215–29.

The author was Chief Surgeon of the United States Army Forces in the Middle East for two years. He defines the Middle East as consisting of, Iran, Iraq, Syria, Palestine, Transjordania, Saudi-Arabia, Egypt, Libya, Anglo-Egyptian Sudan, Eritrea, and Ethiopia.

The diseases of greatest military importance were: the dysenteries, sandfly fever, infective hepatitis, malaria, and the "heat-syndrome." Typhoid fever and the dysenteries were believed to be almost universal infections, which were chiefly responsible for the excessive infant mortality of most of the countries in the area. "Gippy tummy" was found to be a mild form of bacillary dysentery. In the more severe forms of bacillary dysentery sulphaguanidine was dramatically successful when it became available; the average quantity needed for each patient was ¼ pound. In many cases only one day in bed was needed. Sulphadiazine was used later with equally good results. The standard emetine treatment was quite satisfactory in amoebic dysentery, in connexion with which the chief trouble was that laboratory technicians without special training often confused *Entamoeba coli* with *E. histolytica.*

Malaria was of only local importance; the disease was not found on the north coast of Africa east of Tunis, except in Gabes. The most important method of control was the training of the troops in the use of repellents and mosquito nets. Local inhabitants were kept at least a mile away from the camps. Suppressive drugs were not used. Two dramatic cases are described in which soldiers recently arrived from West Africa complained of slight dysentery; malaria was not suspected; both of the men died within 36 hours of cerebral malaria.

The author states that the text-books are not accurate in the statements made about "the duration of the possible carrier state" in sandfly fever, but he does not specify the respects in which the statements are wrong. He says that dengue was a problem in only one locality in the area, *viz.*, Massaua. [This statement must not be taken as an assurance that dengue will be of little importance elsewhere if anti-mosquito measures are relaxed.]

Dr. MAHAFFY, of the Rockefeller Commission, is reported to have found positive mouse-protection tests for yellow fever in the inhabitants of Eritrea.

The period of hospitalization in infective hepatitis was 4–6 weeks, so the disease is of great military importance.

Some confusion of ideas is shown in the comments on tropical or desert sore; it is stated that one of the causes is leishmaniasis, and the claim is made that leishmaniasis was entirely prevented by using antiseptic dressings on the slightest scratch.

Special heat-stroke centres were established in southern Persia and Massaua, the only places in which excessive heat prevailed, and the mortality rates were kept very low. Heat prostration was very common, and was controlled largely by the giving of extra salt in the diet.

The author has made a special study of the effects of prolonged exposure to the effects of heat and has described a condition which he calls "heat syndrome." In this the red-blood-cell count is reduced to 3–3½ million; the systolic blood pressure is low; there are irritability, forgetfulness, and inability

to concentrate ; the resistance to infection, especially of the respiratory tract, is reduced. The disease is said to have no connexion whatever with heat stroke or heat prostration. *John W. D. Megaw.*

GELFAND, M. **The Haemorrhagic Bulla in Onyalai.** *Clin. Proc.* Cape Town. 1944, July–Aug., v. 3, No. 6, 255–9.

One of the characteristic features of onyalai is the presence of haemorrhagic bullae on the buccal and lingual mucosa. These may be many or few and the question arises, if they are very few, say one only, would the fact rule out the diagnosis of onyalai ? The answer would surely be negative. One is reminded of Abraham pleading on behalf of Sodom and Gomorrah, by going, as the author does, even one step further. Peradventure there be none found there ; then we should probably agree that if the other symptoms were present—haemorrhages elsewhere, petechiae, thrombocytopenia, etc.—the diagnosis of onyalai would still hold good, for, if the patient does not die, it is not possible to rule out haemorrhagic bullae in the viscera. So here, the author quotes three cases, two of them at the same time in one family, girls of two and five years. The former was bleeding from nose, mouth and vagina and had haemorrhagic bullae on the tongue, in fact an almost typical case of onyalai. The latter, who died, bled from the vagina and nose, but the only bulla found was in the larynx, though petechiae were numerous in the abdominal viscera. The third patient was a half-caste boy of 12 years, with epistaxis and haematuria, and petechiae on trunk and limbs and subconjunctival haemorrhages, but no bullae on tongue or buccal mucosa ; platelets numbered only 26,900 per cmm., leucocytes 8,200. After a blood transfusion the haemorrhage ceased and recovery was rapid. Was this another case of onyalai or one of Werlhof's purpura (essential thrombocytopenia) ? The case occurred in an onyalai district (Mashonaland) and the patient had had a similar attack a year before. The question is not a purely academic one, for it raises yet another : Is onyalai the same as Werlhof's disease ? The thrombocytopenia is a prominent feature of both ; are the usually noted differences essential ? [See this *Bulletin*, 1944, v. 41, 426, 427, where other references are given.] *H. Harold Scott.*

SLOWEY, J. F. **A Case of Transient Successive Pulmonary Infiltration (Loeffler's Syndrome) associated with Trichiniasis.** *Ann. Intern. Med.* 1944, July, v. 21, No. 1, 130–35. [10 refs.]

A somewhat unusual case of trichiniasis in that none of the early gastro-intestinal symptoms was present, nor any oedema of the face or puffiness of the eyelids, although a biopsy specimen of the deltoid showed 100 larvae per gramme. The symptoms were typical of Loeffler's syndrome of transient infiltration of the lungs, with eosinophilia, 23 per cent. of a total of 22,000 leucocytes per cmm. on admission. Loeffler himself thought that many of these cases were tuberculous in origin ; others have remarked on the association of this syndrome with some form of allergy : asthma (Breton), to ligustrum which flowers in May and June (Engel), *Ascaris lumbricoides* (Wild) and now *Trichinella spiralis*. Since infestation by this last is estimated to have an incidence of about 20 per cent. in the United States and many cases are subclinical, with less than 100 larvae per gramme of muscle, the author suggests that in all cases of Loeffler's syndrome skin tests should be carried out for trichiniasis and, if needed, biopsy examinations. *H. Harold Scott.*

JONES, S. H. & SOUDERS, C. R. **Eosinophilic Infiltration of the Lungs (Loeffler's Syndrome).** *New England J. of Med.* 1944, Sept. 7, v. 231, No. 10, 356–8, 3 figs. [12 refs.]

The case is reported of a negress, 33 years old, complaining of cough, worse at night, and fatigue. She had had similar attacks in the two preceding autumns. X-rays showed localized infiltration of one lung with impairment of resonance and localized sibilant râles. Tuberculosis was suspected, or a neoplasm. Blood examination gave 10,350 leucocytes per cmm., with 48 per cent. eosinophiles. No cause could be found; no tubercle bacilli, no helminth ova, a negative reaction for trichiniasis. Four weeks later the white cells numbered 8,400 per cmm., eosinophiles 27 per cent. and three weeks later still 6,500 and 9 per cent. Recovery seemed to be complete. In spite of no reaction being obtained to "eighteen inhalant and food energens endermically," the authors believe that the syndrome is an allergic manifestation of, at present, unknown aetiology.

H. Harold Scott.

RITCHIE, E. A. A. **Tropical Eosinophilia: an Aetiological Inquiry.** *J. Roy. Army Med. Corps.* 1944, Oct., v. 83, No. 4, 177–82, 2 charts & 2 figs.

COORAY, G. H. **Observations on Malignant Disease in Ceylon based on a Study of Two Thousand Two Hundred and Ninety-Five Biopsies of Malignant Tumours.** *Indian J. Med. Res.* 1944, May, v. 32, No. 1, 71–91, 2 graphs. [25 refs.]

Although biopsy material from a pathological laboratory must fail to provide a complete view of the incidence of cancer in any particular country, the information it provides may nevertheless be of great value. Its limitations are perhaps exemplified by the fact that among the 2,295 examinations considered in Dr. Cooray's paper there were only nine examples of hepatic cancer—a figure which, one would think, can hardly represent the frequency of this form of malignant disease among the people of Ceylon; and the figures for buccal cancer do not give a correct notion of its prevalence because, as Dr. Cooray points out, very many of these cases are so advanced on admission to hospital that no microscopical examination is required for a correct diagnosis. Among several interesting facts it may be noted that, of the biopsies on material from women, 67·8 per cent. represented cancer of the reproductive organs, including uterus (41·7 per cent.), breast (18·5 per cent) and ovary (7·6 per cent.). The majority of uterine cancers arose in the cervix. There were 35 instances of chorion-epithelioma, which accounted for more than half of all the cases of cancer of the uterine body. Cancer of the buccal cavity (8·5 per cent.), and skin (7·7 per cent.) were the next most common sites in women.

Among men, cancer of the penis accounted for 27 per cent., buccal cancer for 21·8 per cent. and skin cancers for 19·5 per cent. of all cases. Of the skin cancers 61 per cent. arose in connexion with chronic ulcers of the leg, which are very common throughout the island; another frequent form was malignant melanoma arising in the sole of the foot.

[When contemplating these figures one is impressed by the large number of cancers which are allowed to occur because straightforward measures of prevention are not employed. Circumcision in childhood would entirely prevent the occurrence of penile cancer, and there seems little doubt that the incidence of buccal cancer would be greatly reduced by abstention from the chewing of betel nut.] *Harold Burrows.*

KENNAWAY, E. L. **Cancer of the Liver in the Negro in Africa and in America.** *Cancer Research.* 1944, Sept., v. 4, No. 9, 571–7, 2 figs. [44 refs.]

The high frequency of primary cancer of the liver in African Negroes is well known. According to BERMAN, who has collected valuable data on this subject, cancer of the liver formed 37·4 per cent. of all the cancers observed among the Bantu in the Union of South Africa, Portuguese East Africa, Kenya, Tanganyika, Belgian Congo and French Equatorial Africa ; furthermore, Berman says that among the natives who come to the gold mines from Portuguese East Africa, cancer of the liver is about six times more frequent than among the natives of the same race who come from other areas. Among the West African Negroes of Senegal, Sierra Leone and Nigeria, cancer of the liver forms 18·7 per cent. of all the recorded cancers. In contrast with these figures, Kennaway points out, the Negroes of the United States, though descended from the West African races, are not subject to a high incidence of hepatic cancer. These facts, among others, suggest to Kennaway that the high incidence of cancer of the liver in the Negro in Africa does not depend on genetic characters alone, but may be due to some extrinsic environmental factor which could be identified if sought. The artificial induction of cancer of the liver in rats and mice by certain compounds, and the prevention of this sequel by dietetic regulation, might give an encouraging lead to such an investigation in the human subject. A brief abstract of this paper is not quite satisfactory ; it should be read in the original.

Harold Burrows.

GENERAL ENTOMOLOGY.

KEILIN, D. **Respiratory Systems and Respiratory Adaptations in Larvae and Pupae of Diptera.** *Parasitology.* 1944, Sept., v. 36, Nos. 1 & 2, 1–66, 54 figs. 2 pls. (1 coloured). [135 refs.]

The author here brings together the result of many years' research into the morphology of the spiracles and tracheae of Dipterous larvae and pupae. He expressly omits his studies on the physiology of respiration and confines himself to structure.

The first part of the paper deals with respiratory systems in Dipterous larvae. It relates to the subjects in which the readers of the *Bulletin* are directly interested at many points : for instance it strengthens the grounds for the classification of Diptera ; it gives a fuller knowledge of the comparative morphology of structures on which we rely in identifying larvae ; it describes the structure of spiracles and of the perispiracular glands, the waxy, hydrophobe, secretion of which is thought to help in excluding water from the tracheal system of aquatic larvae.

The second part of the paper is concerned with modifications in respiratory structure which tend to fit larvae and pupae for life in water, or as parasites, or (in viviparous species) for intra-uterine life. Its value to our readers is that it will relate their particular knowledge of these structures in mosquitoes, Oestrids, etc., to more general studies.

P. A. Buxton.

BARRETO, M. P. & COUTINHO, J. O. Sôbre o gênero *Taeniorhynchus* Arribálzaga, 1891, com a descrição de três novas espécies do subgênero *Taeniorhynchus* (Diptera, Culicidae). [**Three New Species of** *Taeniorhynchus.*] *Arquivos de Hig. e Saúde Pública.* São Paulo. 1944, May, v. 9, No. 21, 53–85, 9 pls. [26 refs.] English summary.

COSTA, O. G. **Furuncular Myiasis.** *Arch. Dermat. & Syph.* 1944, July, v. 50, No. 1, 36, 2 figs.

A man, 18 years of age, a rural labourer, presented himself for treatment on account of small acuminated swellings, like furuncles, 40 to 50 in number on the back and thighs. They caused some pain, especially at night ; they had been present for five months, at first as minute swellings, then becoming more tense and painful and of a violet colour with a red halo and a purulent secretion. As the lesions ripened the tail of a parasite could be seen which proved to be the presenting end of a larva of *Dermatobia hominis* (*cyaniventris*). These swellings are known in Brazil under the names Berne, Torcel or Oura. This form of myiasis is seen in Europe, caused by *Hypoderma diana* or, more rarely, *H. bovis* ; in the United States caused by the latter most commonly, and, rarely by *D. hominis* (*cyaniventris*) ; in South America it is associated with the last-named.

H. Harold Scott.

MANGABEIRA, O., Filho & GALINDO, P. **The Genus Flebotomus in California.** *Amer. J. Hyg.* 1944, Sept., v. 40, No. 2, 182–98, 26 figs. on 3 pls. [34 refs.]

SMITH, C. N. & GOUCK, H. K. **Sprays for the Control of Ticks about Houses or Camps.** *J. Econom. Entom.* 1944, Feb., v. 37, No. 1, 85–7.

It is not practicable to control ticks over wide tracts of open country by the spraying of vegetation, but the authors show that it is possible to bring about reductions up to 90 or 95 per cent. in the numbers of ticks (*Dermacentor*, *Amblyomma*, *Ixodes*) in the immediate vicinity of camps by the use of suitable sprays. The moulting and migration of ticks soon leads to reinfestation, but usually a reduction of at least 75 per cent. was still noticeable after one week. The most successful mixture contained 1·92 ounces of sodium fluoride, 0·64 fluid ounce of nicotine sulphate (40 per cent. nicotine) and 0·125 ounce of neutral soap to one gallon of water, and was applied at the rate of 75–175 gallons per acre. This causes some burning of the vegetation. It had no apparent action on "chiggers" (Trombiculid mites). Other sprays which gave satisfactory results contained pyrethrum with IN 930 (isobutyl-undecylene-amide) as activator, dinitro-orthocyclohexylphenol, or nicotine sulphate alone (1 part of 40 per cent. nicotine sulphate in 200 parts of water). The last gave only a temporary reduction for two or three days but was not injurious to vegetation.

V. B. Wigglesworth.

ROBINSON, G. G. **More Cases of Abnormal Development in the Argasid Tick, *Ornithodorus moubata* Murray.** *Parasitology.* 1944, Sept., v. 36, Nos. 1 & 2, 95–7, 2 figs. [10 refs.]

BUSVINE, J. R. **Simple Experiments on the Behaviour of Body Lice (Siphunculata).** *Proc. Roy. Entom. Soc. of London.* Ser. A. General Entom. 1944, Mar. 28, v. 19, Pts. 1–3, 22–6.

The author wants to know how a man becomes infested with body lice, and to study the travels of these insects under natural circumstances. His method is to release lice on or near a clean volunteer, and to search for them after an interval.

If one takes a lousy shirt off a man and examines it, the lice are found almost motionless, generally against seams ; but it may well be that when the shirt is being worn and they are in the dark they run about. If one releases adult lice at one spot under a woollen vest on a clean volunteer and waits two hours, one finds that on an average they have moved about a foot, measured in a straight

line. Some will have got outside the vest, or even outside the shirt. This experiment simulates what may happen if a clean person becomes infested. But we know from WIGGLESWORTH [this *Bulletin*, 1941, v. 38, 417] that lice tend to stop on an area of cloth on which other lice have previously lived, so that one would expect them to tend to collect in certain spots once an infestation has lasted for some time. The author tried to demonstrate this. He confined sixty lice on a three inch square inside his vest, letting them feed through bolting-silk. After three days, when the area was heavily contaminated with excrement, he removed silk and lice, leaving a dozen on the spot. Two hours later he found that they had travelled about as far as those in the first experiments ; *i.e.*, they did not tend to be home-bound.

If lice are liberated on a pleated cotton body-belt they tend to settle down in its folds, and do not move far in two hours. But if the wearer takes exercise they move further.

Adults travel more than nymphs, and tend, therefore, to be more often found on the outside of garments (as shown by MACLEOD and CRAUFURD-BENSON, *Parasitology*, 1941, v. 33, 278). The author frequently " lost " a proportion of his lice.

If one infests a sleeping bag and then occupies it one is more likely to pick up lice if one wears woollen than smooth poplin. A large proportion of the lice (35–40 per cent.) get out of the bag during the night, a distance of six feet, point to point.

The author tested a standard Ministry of Health garment, designed to protect sanitary personnel from lice. The opening of the back was closed by rolling up flaps and tying with tape. Lice put outside the opening occasionally (about 15 per cent.) walked round the folds and reached the wearer. If the edges of the apertures are treated with Lethane 384 (a proprietary thiocyanate of fatty acids), no lice penetrate. *P. A. Buxton.*

CAMPBELL, G. A. & WEST, T. F. **Persistence of D.D.T. in Oil-bound Water-Paint.** [Correspondence.] *Nature*. 1944, Oct. 21, 512.

One of the most promising ways of utilizing the insecticidal properties of D.D.T. (dichlordiphenyltrichlorethane) has been to apply it as a spray to the surfaces of walls, etc. Here it remains as a film that is toxic for several months to house flies or bedbugs walking over it. The authors report preliminary experiments in which D.D.T. has been incorporated in paints. Its effectiveness against house flies was much reduced when it was incorporated in oil paints and synthetic varnish paints, but it continued to exert its insecticidal action when mixed with an oil-bound water-paint. Experiments with flies in cages treated with a paint of this type, containing 5 per cent. of D.D.T., showed that this was still insecticidal after two months. Small rooms painted with a similar paint containing only 0·5 per cent. of D.D.T. killed 90 per cent. of house-flies overnight. Equally promising results are stated to have been obtained in a factory canteen. *V. B. Wigglesworth.*

MARTIN, H. & WAIN, R. L. **Insecticidal Action of D.D.T.** [Correspondence.] *Nature*. 1944, Oct. 21, 512–13.

To account for the insecticidal activity of D.D.T. the authors put forward the hypothesis that this results from its lipoid solubility coupled with its supposed decomposition within the cell to liberate hydrochloric acid.

V. B. Wigglesworth.

SMITH, M. I. & STOHLMAN, E. F. **The Pharmacologic Action of 2, 2 bis (P.-Chlorophenyl) 1, 1, 1 Trichlorethane and its Estimation in the Tissues and Body Fluids.** *Pub. Health Rep.* Wash. 1944, July 28, v. 59, No. 30, 984–93.

This paper first describes the evolution and testing of a method for estimating DDT in body tissues and fluids : this consists of extraction with acetone, reduction with metallic sodium and titration of the chlorine so liberated. The amounts recovered in one series of such determinations are given : much the largest quantity was found in the bile. DDT is two to three times as toxic as phenol when given by the mouth : the LD^{50} in rats is 150 mgm. per kgm. (administered in solution in olive oil). The effect is cumulative : smaller doses given repeatedly cause chronic poisoning or death. The symptoms of poisoning are hyperexcitability, tremors, ataxia, spasticity and paralysis, with terminal extensor rigidity. Toxic effects were produced by applying a solution in dimethylphthalate to the shaved skin, but the evidence of absorption was slight when fabric on which a solution had been dried was closely applied to the skin. Cyclohexanone, suggested as a solvent for DDT, so far from enhancing its toxicity, appeared to reduce it somewhat. *L. P. Garrod.*

CAMERON, T. W. M. **Fly Sprays and Repellents. Part II. DDT.** *Canadian J. Comp. Med.* Gardenvale, Quebec. 1944, Sept., v. 8, No. 9, 254–8.

REPORTS, SURVEYS AND MISCELLANEOUS PAPERS.

SAPEIKA, N. **Fatal Human Poisoning from Plants in Southern Africa.** *Clin. Proc.* Cape Town. 1944, July–Aug., v. 3, No. 6, 264–71. [15 refs.]

The author has listed between 40 and 50 plants which may cause poisoning in South Africa. Much of this has already been covered by the publications of STEYN, DE WAAL and TIEDT, and Van der WALT [this *Bulletin*, 1942, v. 39, 51, 200, 899, 900]. The present article is written, says the author, because " information about toxic plants is of value to practitioners who may have to treat cases of poisoning," but from this point of view it will have little value. There is no description of the plants by which they can be recognized, and no illustrations ; merely the scientific names, the local names and the districts where they flourish, the active principle when known and the main general symptoms. Nothing is said concerning treatment, hence practitioners will not obtain much help from the account. In nearly two-thirds of those mentioned the statement as to their toxicity is largely hypothetical, the words used being : " is believed to have caused death," " may have been a factor in," " is alleged to have," or " supposed to have " caused poisoning. [The subject is one of the very greatest interest to the medical practitioner, to the toxicologist, the botanist, the pharmacologist and the jurist. Why does not someone write up the whole matter, giving the scientific and local names of the plants, descriptions of them with illustrations ; also an account of the toxic principles and their actions, the symptoms of poisoning by them with illustrative cases, and the appropriate treatment ? For those already known, as Senecio, Adenium, Scilla, etc., little more than collation of facts would be needed, with reports of actual cases ; for others less known or unknown, search for the active toxic principles and their actions would be a work of absorbing interest and of very great utility.] *H. Harold Scott.*

FAUST, E. C. **Diseases in the Tropical War Zones. IV. The Diseases of the Middle East, India, Assam and Burma.** *Gastroenterology*. 1944, June, v. 2, No. 6, 395–411, 9 figs. [figs. 23–31]. [19 refs.]

In this contribution Professor Faust continues his brief account of the diseases encountered in various parts of the world. The term Middle East does not, in this paper, include the Mediterranean area, but does include S.E. Arabia, Iraq and Iran. The account is given by diseases, as before [see this *Bulletin*, 1944, v. 41, 966–967] and is illustrated by distribution maps. Some explanatory matter on transmission is added, and the whole forms a skeleton account of the diseases to which American troops may be exposed. *Charles Wilcocks.*

BOOK REVIEW.

COOLEY, R. A. [Senior Entomologist] & KOHLS, Glen M. [Associate Entomologist]. **The Argasidae of North America, Central America and Cuba. The American Midland Naturalist Monograph No. 1.** 1944, June, 152 pp. 57 figs. & 14 pls. Edited by Theodor Just, Published by the University Notre Dame, Notre Dame, Ind.

Since about 1936 there has been a great increase in knowledge of the species of *Ornithodorus* of North America, and it has been realized that relapsing fever in man is rather widespread, though uncommon, and that several species of this genus can transmit the infection. The new work has come out in a considerable number of brief papers, and it is welcome to see much of it brought together and unified. The author, a ripe scholar, has been a leader in these new developments.

In North America twenty-five species of *Ornithodorus* occur, and it is known that five of them, *hermsi*, *turicata*, *parkeri*, *talaje* and *rudis* occasionally transmit spirochaetes to man and cause relapsing fever; in every case it seems that the infection in man is an overflow from some other mammal.

The book is a contribution to systematics, but many interesting biological points emerge from it. One is the extraordinary range of hosts of some of these ticks: *O. stageri* feeds on bats, also man; *parkeri* on rodents, burrowing owls and man. The point is well seen in the lists of recorded hosts of each species at the end of the book (though it is not clear that the tick has actually been recorded *feeding* in all cases.)

The book is concerned mainly with identification, and descriptions of species, with emphasis on points of distinction of larvae. It provides synonymy, keys to genera, maps of distribution and excellent photographs and line drawings of the ticks themselves. In the author's view *Argas*, *Otobius* and *Antricola* are valid genera, in addition to *Ornithodorus*. *P. A. Buxton.*

Printed under the authority of HIS MAJESTY'S STATIONERY OFFICE
by The South Essex Recorders, Ltd., Ilford.

(1399) Wt. P0/279 2/45 S.E.R. Ltd. Gp. 432

ALPHABETICAL LIST OF AUTHORS OR SOURCES.

de Almeida Prado, A., 143.
Anderson, C. R., 106.
Aschenbrenner, R., 104.
—— & Marx, R., 105.
Auerbach, M. E. & Eckert, H. W., 90.

Begg, A. M., Fulton, F. & van den Ende, M., 104.
Benians, T. H. C., 95.
Berberian, D. A., 102.
Berkowitz, A. P., 107.
Blacklock, D. B., 91.
Bloom, H., 121.
Böger, A., 130.
Bol. Oficina Sanitaria Panamericana, 87.
Bonnard, A., 140.
Bose, B. C. & Ahuja, H. L., 121.
Boshell-Manrique, J. & Osorno-Mesa, E., 114.
Braun, H. & Unat, E. K., 108.
Brugsch, H. G. & Gill, D., 141.
Btesh, S., 128.
Busvine, J. R., 151.
Byrne, E. A. J., with J. H. Croxon, 142.

Caldwell, F. E., 94.
Campbell, G. A. & West, T. F., 152.
Cavazzi, G., 113.
Chambers, H. D., 131.
Chorley, T. W., 98.
Cimmino, V., 102, 106.
Clow, J. M., 101.
Cochrane, E., 86 *bis*.
Collins, J. D., 117.
Cooley, R. A., 154.
Cooray, G. H., 149.
Costa, O. G., 151.
Culbertson, J. T. & Rose, H. M., 136.
Cupi, N., 132.

Das Gupta, N. C., Banerjee, P. K. & Sen Gupta, S. B., 129.
Durand, P., Beguet, M., Horrenberger, R. & Renoux, G., 107.

Fasal, P., 138.
Faust, E. C., 154.
Fehily, L., 139.
Ferriman, D. G., & Mackenzie, G. K., 124.
Ferro-Luzzi, G., 100.
Florio, L., Stewart, M. O. & Mugrage, E. R., 118.

Gajewski, J. E. & Tatum, A. L., 92.
Gelfand, M., 148.
Giroud, P. & Panthier, R., 104.
González Ochoa, A. & Ruiloba, J., 142.
Good, R., 91.
Gupta, R. D. & Laha, P. N., 87.

Halpert, B. & Ashley, J. D., Jr., 126.
Hay, C. P., 109.
Heilig, R. & Visveswar, S. K., 127.
Held, A., 113.
Henschel, A., Taylor, H. L., Brozek, J., Mickelsen, O. & Keys, A., 145.
van Hoof, L., Henrard, C. & Peel, E., 96.
Horrenberger, R. & Renoux, G., 107.
Howat, H. T., 123.

Jones, S. H. & Souders, C. R., 149.

Keilin, D., 150.
Kennaway, E. L., 150.
Kikuth, W., 102.
Krakower, C., Hoffman, W. A. & Axtmayer, J. H., 133.

Ladell, W. S. S., Waterlow, J. C. & Hudson, M. F., 143.
Lancet, 88.
Latienda, R. I. & Carpanelli, J. B., 137.

Macchiavello, A., 103.
McGavack, T. H. & German, W. M., 141.
McGregor, I. S. & Loewenstein, A., 91.
Macquaide, D. H. G., 143.
Mariano, J., 133.
Martin, H. & Wain, R. L., 152.
Mazzotti, L., 134.
Misra, K. N., 120.
Morgan, C. N., 124.

Nájera Angulo, L., 130.

Palmer, E. D., 135.
Perlowagora, A. & Lennette, E. H., 114.
Philip, C. B., Paul, J. R. & Sabin, A. B., 119.
Pirot, R. & Bourgain, M., 137.
Potts, W. H., 98.
Puri, I. M., 85.

Ransome, G. A., Gupta, L. M. & Paterson, J. C. S., 146.
Raven, R. W., 106.
Redmond, W. B., 95.
Ritter, C., 134.
Ruge, H. & Kremer, H., 85.

Sams, C. F., 147.
Sapeika, N., 153.
Sarrouy, J., Dendale, R., Combe, P., Arnaud, R. & Gillot, F., 102.
—— & Gillot, F., 101.
Sellards, A. W. & McCann, W. S., 116.
Senekjie, H. A., 130.
Sergent, Et., 141.
Shortt, H. E., 100.
Siedek, H., Kasperczik, K. & Fanta, H., 105.
Sliwensky, M., 91.
Slowey, J. F., 148.
Smirnov, G. G., 135.
Smith, C. N. & Gouck, H. K., 151.
Smith, M. I. & Stohlman, E. F., 153.
Sofia, F., 109.
de Souza-Araujo, H. C., 132 *bis*.
Striberny, L., 92.

Tang, F. F., Chu, C. M. & Wong, Y. W., 120.
Tomassi, G., 140.

Unti, O., 86 *bis*, 87, 90.

Vanderplank, F. L., 99.

War Office. Army Med. Dept. Bull., 112, 116.
Wedd, S., 111.
Wilkinson, P. B., 137.
Williams, C. L., 117.
Wolpers, C., 86.

Yacob, M., 119.

Zair, A. H., 111.
Zozaya, J., Varela, G. & Castro Estrada, S., 148.

AN
ANNOTATED BIBLIOGRAPHY OF
MEDICAL MYCOLOGY
1943.

Edited by

S. P. WILTSHIRE, M.A., D.Sc.
DIRECTOR, IMPERIAL MYCOLOGICAL INSTITUTE,

in collaboration with

CHARLES WILCOCKS, M.D., M.R.C.P., D.T.M. & H.
ACTING DIRECTOR, BUREAU OF HYGIENE AND TROPICAL DISEASES,

and

J. T. DUNCAN, F.R.C.S., L.R.C.P. (Ire.), D.T.M. & H.
LECTURER IN BACTERIOLOGY, LONDON SCHOOL OF HYGIENE AND TROPICAL MEDICINE.

Published 1944] [*Price 5s. 0d. net, post free.*

Orders should be addressed to the Director, Imperial Mycological Institute, Ferry Lane, Kew, Surrey.

'HYPOLOID' BRAND
Stibophen

in schistosomiasis. Also oriental sore, leishmaniasis americana, filariasis and undulant fever.

In sets of ampoules and in multiple-dose containers.

BURROUGHS WELLCOME & CO.
(The Wellcome Foundation Ltd.)
LONDON

Publications of the Bureau of Hygiene and Tropical Diseases.

TROPICAL DISEASES BULLETIN

containing classified summaries of current papers and reports from the medical and scientific publications of the world on diseases of the tropics and warm countries.

(ISSUED MONTHLY.)

Subscription rate (in advance) : 21 shillings per annum, post free. The subscription runs from January to December. Single numbers 2s. 6d. each.

BULLETIN OF HYGIENE

containing abstracts of current medical literature on public health administration, social services, communicable diseases, sanitation, nutrition, industrial hygiene, bacteriology and immunity, and related subjects of public health interest.

(ISSUED MONTHLY.)

Subscription rate (in advance) : 21 shillings per annum post free. The subscription runs from January to December. Single numbers 2s. 6d. each.

ORDERS and SUBSCRIPTIONS may be sent direct to the

BUREAU OF HYGIENE AND TROPICAL DISEASES,
Keppel Street,
Gower Street,
London, W.C.1

or through any bookseller.

Cheques and Postal Orders should be made payable to the "Bureau of Hygiene and Tropical Diseases," and crossed "Westminster Bank Ltd."